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by W. H. Dalrymple, Baton Rouge, La.

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TRANSFERABLE MEMBERSHIPS.

Members of the Veterinary Service of the Bureau of Animal Industry are frequently changed from one state to another, and as a rule these members of the profession like to become identified with the veterinary associations of the states in which they may be located. At present, however, it would seem that, no matter how many changes they may be called upon to make in the Federal service, they have to pay dues to each state organization with which they may desire to become affiiated.

Unfortunately, these veterinarians are not generally overpaid —perhaps the reverse in some instances—and their having to pay additional dues for each change of location they make seems not only a hardship on them, but may, and probably does, prevent some of them from identifying themselves with state associations that otherwise might prove mutually beneficial.

This possibility has suggested the idea that reciprocal arrangements might be made whereby these veterinarians could have their memberships in one state association transferred to another when they are called upon to move, in the same year, without having to pay additional dues with each change of location.

At the last meeting of the A. V. M. A. there was a substantial increase in the membership, due largely to the addition of Bureau veterinarians, which cannot fail to strengthen the Association and add to its usefulness. Anything, therefore, that can be done to encourage the Bureau men to affiliate themselves with the state associations, where they may be temporarily located, should, we feel, be done by these organizations. And, while we do not think the payment of additional dues would prevent some from becoming members of state associations, there may be others who might feel it a little severe on their pocketbooks to have to pay dues, for the same year, whenever they are required to make a change from one state to another.

The easiest remedy we can suggest for this condition is for the various state associations to reciprocate in the matter by adopting a system of transferable memberships for such Bureau men.

"DEFICIENCY TROUBLES."

Since attention was first directed to *vitamines* by Casimir Funk, in 1912, and that their absence, or diminished supply, in food was largely responsible for nutrition-deficiency, a considerable amount of work has been done in an experimental way to test the question as to its applicability in practice, not only as regards human nutrition, but also as it applies in the feeding of animals for successful growth and reproduction. So far, the results have been little short of astonishing, and are likely to upset the prevailing theory as to balanced rations, irrespective of the source of their nutrients, being able, adequately, to supply all of the material necessary for the successful upbuilding of tissues in the mature animal, and of those, also, of the young creature *in utero*.

It may be possible, also, we think, that nutrition-deficiency brought about through lack of the necessary vitamine supply in animal feeds, may be responsible for certain unfortunate conditions in breeding herds of cattle that, hitherto, may have been attributed to entirely different etiological factors.

Some time ago Hart, Steenbock and Humphrey, of the Wisconsin Experiment Station, conducted a series of experiments with cattle to test the effect of balanced rations on growth and reproduction. The rations were balanced, in so far as they con-

tained the theoretical amounts of digestible protein, and the required therms of energy, but were composed of different raw materials. In one case the ration was composed entirely of feeds obtained from the corn plant; in another from the wheat plant; in another from the oat plant, etc. When the animals fed the corn plant ration began to reproduce, strong calves were always the result; they were always carried to maturity, and no trouble was experienced at parturition. On the wheat plant ration, the cows were never able to produce normally, the calves were born 25 or 30 days ahead of time, they were undersized and weak, and would never live over four or five days; besides, the mother would frequently fail to properly clean, etc. On the ration balanced from the oat plant, it was demonstrated that a perfect ration could not be made from it alone, as in this experiment the calves were born prematurely, and seldom lived. It should be mentioned that the possibility of abortion disease was eliminated from these experiments, as the herd was under observation by the Station veterinarian, and was found free from that disease during the entire period of the work.

Quite recently the writer was asked by a party in one of the Canadian provinces to give an opinion as to the cause of death of a number of calves in his herd; and the description given was as follows:

"Last spring I had 32 cows freshen. At present (January 1, 1919) I have only six calves. The calves mostly die when a few days old. Most of them were born with lumps on their jaws. A few came wrongly presented, with their head or legs turned back. A number of cows retained their after-births. Cows have again begun to calve, and the calves are dying as before. Calves stretch out with the head back, breathe hard and die. Cows were pastured in summer on natural prairie grass, and in winter, fed on oat straw, prairie hay and oat-chop; beginning the chop about three weeks before the cow calves."

We were inclined to the opinion, that, in the absence of the infection of abortion disease, nutrition-deficiency might probably be the cause of the trouble; and, while the same method of feeding might have been practiced for a number of years, the long-continued use, without change, of materials deficient in vitamines, those chemical substances in food so absolutely essential for growth and reproduction, might, after a time, seriously interfere with the reproductive powers of the animal.

Lack of space forbids going further into detail; but, as the Wisconsin investigators remark:

"While it is well known that considerable trouble from contagious abortion is often met with in dairy districts, it should also be recognized by breeders that it is possible to produce dead, or weak, premature calves from the improper selection of feeds."

Our main purpose, at this time, however, is to suggest the possibility of sometimes mistaking the effects of nutrition-deficiency, as may be manifested in the offspring of a herd, for abortion disease itself. The study of deficiency troubles is of such recent origin that practitioners, generally, may not, up to the present, have devoted much time to it. Investigations seem to prove, however, that their results may be quite disastrous in the dairy, or other breeding, herd; and as premature births, dead or short-lived calves, etc., may often follow, it is not unreasonable to presume that errors in diagnosis may sometimes be made.

THE NEW ORLEANS MEETING.

A slight change in the date of the New Orleans meeting of the A. V. M. A., from that previously announced, has had to be made, and it is now definitely fixed for the week beginning November 17.

It was found that October 13, the original time fixed, was going to conflict with other large gatherings in New Orleans, notably an International Cotton Conference, which was slated for the same date as the A. V. M. A. meeting. To have held the convention a little earlier would have interfered with many members belonging to veterinary and state colleges leaving home at a time when their institutions were about to open upon their session's work.

To avoid both of these contingencies, the matter was again taken up with the New Orleans authorities, and it was decided that the week beginning November 17 would have nothing to interefere, locally, and all the hotel accommodation necessary would be at the disposal of the A. V. M. A. meeting. The Executive Board has, therefore, decided on the November date, which we believe will suit the much greater number of the membership, and will prove more enjoyable and agreeable in every way. Now that this matter has been definitely settled, we would suggest that members bear the change of date in mind, and that they make their arrangements accordingly.

INVESTIGATIONS TO DETERMINE THE CAUSE OF CERTAIN SHEEP DISEASES IN COLORADO.*

G. H. Glover, I. E. Newsom, E. W. Alkire,
Fort Collins, Colorado.

Owing to an abundance of highly nutritious food, particularly of alfalfa and peas, Colorado has for many years been famous as a lamb-feeding center, and Colorado alfalfa and pea fed lambs have a large place in the stock markets of the country during the late winter and spring. The practice of buying lambs in the fall and fattening them during the winter months began somewhere between 25 and 35 years ago, and has now developed to the point where a million and a quarter are fed each winter.

The particular districts in the State which have gone into this feeding most extensively are northern Colorado between Denver and Cheyenne, taking in the territory contiguous to such towns as Longmont, Loveland, Fort Collins, Greeley and as far east as Sterling. The Arkansas Valley in a less measure has also developed the feeding industry to a high degree. In these two districts it is a common practice to feed alfalfa almost entirely as roughage and to purchase Kansas and Nebraska corn, or more recently barley, to furnish the necessary grain ration. In the San Luis Valley the conditions are quite different from the other two districts because a single crop furnishes both the hay and grain ration. The floor of the valley is approximately 7,500 feet above sea level, and, while alfalfa does well in certain districts, yet the staple crop is field peas. This crop is seldom harvested by machinery, but when the peas are ripe, hogs and lambs are turned into the fields to do their own harvesting. This practice seems to have been going on for some 12 or 15 years, and in general with decided success. It is not surprising that with many men going into the feeding business each year, and with the accumulation of large numbers of lambs, many of which are kept very closely confined for from three to five months at a time, that a considerable loss should occur. In the earlier years of the feeding industry losses were extremely light, and were more frequently the result of lambs in the pens being covered with snow during severe blizzards. In more recent years, however, the losses have in the aggregate become considerable, and in many instances not only the profits associated with the business, but much of the principal

* Presented at 55th Annual Meeting, A. V. M. A., Philadelphia, 1918.

has been lost because of the death of a large percentage of the lambs. For some eight or ten years the Experiment Station has from time to time been called upon to examine into the losses of certain lambs on feed, but until some three years ago no systematic attempt was made to determined the actual causes of death.

EARLY LOSSES.

During the winters of 1914-15 and 1915-16, the losses of lambs in the San Luis Valley on field peas were unusually heavy, so much so that all of the veterinary authorities in the State were called upon to and did make certain superficial investigations to determine the cause of the loss. It was estimated that in this small district more than 5,000 lambs died during each of these two winters. The disease appeared to be confined almost, if not entirely, to lambs, older animals being practically never affected. Visits to the district seemed to show that when the lambs were removed entirely from the pea fields and put on alfalfa hay the loss was reduced to the minimum. However, owing to the large number of peas which had to be used and the small amount of alfalfa, this procedure was not economically feasible. Many men, rather than endure the loss, shipped their lambs to market when only partly finished. The symptoms were quite varied. In the more acute cases, apparently healthy and nearly fat lambs would suddenly throw their heads back, fall, struggle a few times and die, almost as though from an apoplectic stroke. In those cases which survived longer, there was a certain amount of dullness, diarrhœa supervened, and death might follow in from one to eight or ten days. In many instances these animals recovered. Post-mortem examination often revealed no lesions whatever. Where lesions did exist, there was frequently present gastro-enteritis, particularly noticeable in the fourth stomach, which showed a deep reddening, and in the first few inches of the duodenum. In many instances swollen and hemorrhagic lymph glands were not uncommon. Some hemorrhages in various parts of the body were often found, and occasionally laryngitis, tracheitis,and even penumonia and pleuritis were to be discovered. From such observations as we were privileged to make, we felt, however, that the most constant lesion was in the fourth stomach and duodenum.

Needless to say, there were various theories to account for the heavy loss, and many contradictions. There were those who believed that mold on the pea vines was responsible, and it was true that where the peas were heavy, mold could be found in

considerable amount. It seemed also true that in many fields where the losses were not heavy, just as much mold could be found. One rather significant statement was brought out, and that was that during the earlier years of raising peas, it had been common practice to plant them with oats as a nurse crop. This, it was stated, resulted in the peas not bearing so heavily, and also in their standing up better, and, therefore, not being so liable to mold. During the years in question, it was stated that no oats had been planted.

On the other hand, there were those who believed that the system of feeding was at fault, and to this view we at the Station were inclined to adhere. On general principles, we looked upon a lamb as being merely a baby of a different species and, knowing that heavy protein feeding often resulted in diarrhœa and dysentery in babies of the human species, we felt that it was quite in keeping to believe that baby sheep when allowed to gorge themselves on such a high protein diet might develop intestinal disorder. We event went so far as to suggest in some instances that if the peas were harvested and fed to the lambs in definite amounts, it might be possible to control the condition. The fact that there was frequently a gastro-enteritis and that a change of feed in most instances resulted in a betterment of the condition, seemed strongly to indicate that the food was a factor. Mitigating against this, however, was the fact that in many fields where lambs were turned on to the fields, with apparently little judgment, and allowed to eat when they would, there was no loss. In other instances, lambs after showing disease in the lot would continue to die, even though they were allowed on the peas not more than ten minutes a day.

In northern Colorado we had from time to time been called upon to determine the cause of losses under entirely different conditions of feeding. One of the most severe losses of which we recall occurred during the winter of 1914 near Erie. (Lot. No. 1.) This man had two lots of sheep in pens approximately a quarter of a mile apart. There were about 1,700 in each lot. They had been brought in some two months previously, had been allowed to clean the beet tops off of one or two fields, after which they had been put into pens and fed alfalfa meal, in which had been sprinkled the grain ration, consisting of corn chop. This was fed in self-feeders. The weather was quite severe. Although both lots were getting food from the same source, there had been a loss of over 300 in one lot; whereas, not more than five or six

had sickened in the other. There were also many others sick in the first lot, so that it is quite probable there was a loss of 500 or 600 before the feeding period was over. Most noticeable symptoms were dullness and a bloody diarrhœa. The lesions were largely gastro-enteritis, with occasional pneumonic cases, and many showing hemorrhagic lymph glands. While the conditions of feeding appeared to be ideal, in following our lead at the time we explained carefully to the owner that lambs, being rather delicate, often obtained too much grain and consequently suffered from gastro-enteritis. We recommended that the grain ration be cut down materially, which was done, but with no decided noticeable diminution in the number of cases of illness.

We were called during the years 1914, 1915 and 1916 to many places, more commonly during the first month of the feeding period, where many lambs were dying. It did not seem to matter whether they were getting barley, corn chop or whole corn; conditions were usually approximately the same. Many would have a diarrhœa, some would die without showing noticeable symptoms and others would recover. The usual loss ran from 50 to 100 out of 1,000. This loss would sometimes take place within the first two weeks, after which there would be little or no loss throughout the feeding period. In other instances, the losses would continue, sometimes gradually, sometimes spasmodically, throughout the four or five months in the pens. We usually recommended a marked decrease in the grain ration and were frequently met with the statement that the lambs had been on feed for two weeks and were only getting a quarter of a pound per head per day. We were usually told also of some neighbor who had increased his grain ration very rapidly and without loss. In some instances, we found that, following the decrease of the grain ration, losses stopped, but upon the addition of any considerable amount they began again, so that, on the whole, it was quite baffling. So long as they did not feed grain there seemed to be little loss, but feeding grain was essential to the industry, and as a consequence many of the feeders cut the Gordian Knot by simply giving a large amount of grain and taking their losses, contending as they did so that it was better to fatten a considerable percentage of the sheep and lose some than to save all and fatten none. Strange to relate, in some of these instances losses stopped even when the feeding of grain was very heavy.

Some other detailed records of these early cases may be advisable at this time.

Lot No. 2.

A lot of 2,650 Wyoming lambs were first visited on December 24, 1916, near Timnath, Colorado. They had been in the pens for two weeks and at that time were getting three-fourths of a pound of barley a day. The owner explained that he had been feeding sheep for thirteen years, but had never increased the grain ration quite as rapidly as this before. Neither had he had any appreciable loss in previous years. At the time of our visit some 35 lambs had died and a few were showing diarrhœa. Post-mortem examinations were made of two that had died the night previously. Bright red hemorrhagic areas were present in the small intestines and in one of them a highly inflamed fourth stomach. Tape-worms were present in the bile ducts and also in the small intestines. The lungs were normal, but one animal showed a severe laryngitis.

On December 26 the place was visited again. Owner had lost three the previous night. A sick and a dead one were brought to the laboratory for examination. The dead one showed the presence of tape-worms and a hemorrhagic fourth stomach, but no other lesions. Visits were made from time to time during the next month. The lesions in those posted varied from an extensive inflammation of the gastro-intestinal tract with laryngitis, tracheitis and pneumonia to a few pin point hemorrhages in some of the serous membranes. The owner found that when he cut down his grain ration the losses would seem to disappear, but that when he began to increase they began again. Finally he fed them as had been his custom in previous years and took his losses, which amounted to 95 head during the feeding season. It would be possible to add materially to this list of early cases, but without adding any considerable amount of information on the subject. Suffice it to say that between 5,000 and 10,000 sheep are lost annually in the feed lots of northern Colorado and the Arkansas Valley exhibiting some such symptoms and lesions as described above.

FEEDING EXPERIMENTS.

Having developed the hypothesis that irregularity or overfeeding was largely responsible for much of our loss, we outlined an experiment by which we hoped to determine the amount of the various concentrates which would cause death in lambs and the

conditions under which they must be fed in order to result in loss. In the fall of 1916 we purchased a small lot of lambs in order to try out various kinds of feed. Unfortunately for our purpose, these 32 lambs were small, thin and weak. One was dead on arrival, another died the same afternoon and still another on the following day. Nineteen in fair condition were placed in a pen by themselves on December 2, 1916.

The grains selected were corn chop, barley chop and whole shelled peas. The corn and barley were purchased from a local dealer and the peas were obtained from the San Luis Valley. All lambs were given alfalfa *ad libitum*.

Space does not permit of a detailed account of the handling of each one of the lambs, but they were arranged in such manner as to give overfeeding and irregularity a most severe trial. Some of them were started in with two pounds of grain and kept on all they would eat throughout the feeding period. Others were fed for a considerable period of time and then food was withheld for several days, after which it was again given at liberty.

Radical changes were made from corn chop to peas, from peas to barley and from barley to corn chop, so that, altogether, we feel that if it were possible to kill lambs by irregularity or overfeeding we should have had a considerable number of deaths in these lots.

During 1917, two lots of 10 lambs each were used in the work and some radical changes were indulged in. Out of the 39 lambs used in the two years' work only one was lost, but there was little reason to believe that the irregularity or overfeeding had anything to do with the loss, since it died while eating one pound of barley chop, whereas, others time and again received twice this amount. Several of them became indisposed and it was noticed that sometimes following a large consumption of grain there would be some scouring, with a subsequent falling off in the grain consumed. Since these experiments were purposely arranged to give extreme conditions, we were unable to conclude that lambs could be readily destroyed by irregularity or overfeeding with the feeds used: *i. e.*, peas, corn chop and barley chop. Many excellent feeders have said that sheep sometimes overeat, following which they will become slightly indisposed and scour, but these men do not believe that overeating causes death in very many cases.

LATER OUTBREAKS.

Until the fall of 1916, practically all of our experience had been with lambs on grain feed. Since that time, however, a number of cases have come under our observation where the lambs were either receiving no grain at all or only such a small quantity as to be practically negligible. Lot No. 3 was so suggestive as to start us on a new line of investigation entirely.

Lot No. 3, some four and a half miles east of Fort Collins, was visited on November 29, 1916. Altogether, the owner had on feed some 4,000 lambs, but his loss was occurring from a flock of about 500 Mexican lambs that had been shipped in on November 7. They had been running on alfalfa stubble until about a week previous to our visit, when they had been changed to a field of beet tops. The owner had noticed two or three days after turning them into this field that some were not doing well and were sluggish about coming in at night. He said a few were scouring, but not many. Two days previous to our visit he had changed them back to the alfalfa stubble, but had on the day of our visit shut them up in the pen entirely. They had had no grain, but had been fed alfalfa hay at night. About 40 had been lost. On the day of our first visit, we posted eight or nine lambs. Nearly all of them showed a severe laryngitis and in three or four tracheitis. No pneumonic condition was found, but hemorrhagic spots appeared throughout the lungs. In several subpleural and subepicardial hemorrhages were quite constant. In one instance there was considerable hemorrhage under the capsule of the spleen. In one there was considerable edema under the jaw. The fourth stomach was decidedly inflamed and reddened in two or three. The intestines showed spots of severe inflammation in the mucous lining and some subserous hemorrhages. In one the abomasum showed hemorrhages into the leaves. The sheep were in fair condition, weighing about 65 to 75 pounds. One was brought to the laboratory that had died about the time of our arrival. Post-mortem revealed no laryngitis or tracheitis. There was congestion of the lungs and a considerable number of subpleural hemorrhages. Many of the lymph glands were hemorrhagic. The fourth stomach was deeply reddened, swollen and inflamed throughout. The intestines were inflamed in certain areas. Animal was in a good state of flesh. Smears made from the heart blood, pleural hemorrhages, spleen and lung all showed the presence of a bipolar organism. Cultures were made from the heart blood and pleural fluid, revealing a small gram negative

organism in pure culture. A guinea pig and rabbit were inoculated from the heart blood and pleural fluid respectively. The pig died the night of November 30. Smears were made from various organs, but only those at the point of inoculation showed the bipolar bacillus. Cultures from the heart blood of this pig were negative. On keeping the sheep in pens and well bedded, the losses ceased within the next few days.

On February 21 we were called again to this place and informed that during the past week two or three lambs had been lost each day. By this time they were getting one and a third pounds of whole corn per head daily, and about ten days previously he had put them on an eighth of a pound of beet syrup. Soon after putting them on the syrup they began to die, so that on the 16th he discontinued it. The lambs, however, continued to die. The corn did not appear of very excellent quality. The hay was stack-burned, but the owner contended he had been feeding this for some time previously; also it was the same kind of hay that his other lambs were getting where no loss occurred. Two of the animals were posted. One showed extreme inflammation of the abomasum and small intestines. The other a slight inflammation of the abomasum. There were no tape-worms in either. Two sick ones were brought to the laboratory and one was killed that afternoon. This animal was in a comatose state and unable to rise. He had a marked diarrhœa, which was common to most of the sick ones. Absolutely no lesions whatever could be found in this slaughtered lamb except congestion of the brain. Smears from the heart and kidney were negative as far as bacteria were concerned. One made from the lungs showed bipolar organisms, but others were also present.

The other sheep was scouring badly and on excitement would fall and exhibit convulsions. He would later rise, but was very dull. At times his legs would spread, letting him fall to the ground, so that he laid in a straddling position on the ventral surface of the body a share of the time. Fifteen c.c. of blood from this sheep were drawn from the jugular while he was still alive, 13 of which were immediately injected into a normal lamb, the other two were given to a rabbit intraperitoneally. Neither of these animals showed any effects of the inoculation. The disease continued until there had been a loss of 120 lambs.

Lot No. 10.

Consisting of 2,500 Idaho lambs in pens on the outskirts of Windsor. They had been in the pens one week when seen on October 12. Some had scabby lips, while several were noticeably ill. There had been a loss of about 12 head. Weather conditions were favorable. The lambs had had no grain up to this time. Of two posted, both showed a fibrino-purulent pleuro-pneumonia. It was suggested to the owner that the sheep had probably been exposed to untoward weather conditions in transit. A diagnosis of pneumonia was made and the impression left that he probably would not have much further loss. Smears made from the lung tissue brought to the laboratory revealed a bipolar organism. The place was visited again on October 15, at which time he had lost about 20. Four were posted. Of these three showed a pleuro-pneumonia as previously, whereas the other showed a normal lung, but the fourth stomach was decidedly inflamed. Some 20 or 25 head were noticeably sick. They were visited again on October 23. Thirty-six had died by this time and all that were posted showed pneumonia. Smears made from the lungs showed a bipolar organism, and a rabbit inoculated from an emulsion of the lung tissue intraperitoneally on October 23 died on October 27. Smears made from the various organs of this rabbit showed bipolar bacilli, with no other organisms present. The place was visited again on November 6, the loss having been increased to 50. Many of them were scouring, but those that were posted showed pneumonia. Feeling that the disease probably was hemorrhagic septicemia and that there seemed no other way of handling it, we recommended that the whole flock be vaccinated, explaining at the time that no sheep vaccine could be obtained so far as we knew, but that cattle vaccine might be serviceable. We offered to administer the vaccine free if the owner would pay for the material used. One of the sick animals was brought to the laboratory, but died on the way. On the following day, November 7, smears made from the lungs showed a bipolar organism. A rabbit was inoculated intravenously with 2 c.c. of an emulsion made from the lungs. The rabbit was found dead on Monday morning, November 12, and had been dead for some time. Smears made from the various organs showed numerous bipolar bacilli. Cultures made from this rabbit revealed a small gram negative organism. The owner finally decided to vaccinate 500 and accordingly separated out this num-

ber, taking all the sick and any that appeared to be weak. On November 10, the vaccine having arrived, it was given in 2 c.c. doses to 504 animals, including about 40 that were noticeably sick and that had been separated into the sick pens. On November 13, the place was visited again, when report was made that two had been lost since vaccination and that one of these had not been vaccinated, owing to the fact that it was in a comatose state at the time the vaccine was administered to the others. The owner felt that all of the vaccinated animals were looking better and said that no more had sickened.

On November 23, one more animal had been lost and at this time only one was sick. The others appeared well. December 1 the owner had lost four out of the vaccinated sheep all told, but at this time there were 11 sick from the unvaccinated ones. These sick ones were each given 3 c.c. of vaccine. On December 28, he reported that the sheep were all doing well and that only two had been lost since the previous visit, but he felt that these had died from bloating or overcrowding and not from the original disease.

Lot No. 11.

Consisting of 1,100 Colorado lambs in pens four miles east of Berthoud. These were visited on November 9, 1917, at which time they had been in pens about two weeks. A severe storm had struck these sheep a few days after their arrival and since that time 27 had died, although the weather at the time of our visit was pleasant. The alfalfa appeared to be of good quality, in addition to which they were being fed a fourth of a pound of oats per head. Symptoms were coughing and discharge from the nose. A few were scouring, with temperatures from 103 to 106. Post-mortem revealed a severe bronchitis, with a little lobular pneumonia. A few hemorrhages were noted at the base of the heart. There was some redness in the abomasum and subserous hemorrhages of intestines. Smears from the lungs showed a bipolar organism. It was recommended to the owner that he wait a few days and if his losses continued that it would be wise to try vaccination. A rabbit inoculated with a lung emulsion on November 10, died during the night of November 12. Smears from various organs from this rabbit showed a large number of bipolar organisms. Cultures made revealed a small gram negative bacillus.

On December 3, the local veterinarian reported that the owner had lost a few after our visit, but that none had died for about ten days.

On December 7, the owner brought a sick sheep to the laboratory and reported that he had lost 32, and that, while they had stopped dying for a time, he was now losing a few more. He had invested in half a ton of sheep tonic, sold by a certain chemical company, following which there had been no loss for ten days. The sick sheep was slaughtered and a post-mortem showed a very slight bronchitis and a very severe reddening in the fourth stomach. A rabbit inoculated from the heart blood remained healthy. December 16, the owner called up, saying that he was still losing lambs. The place was visited again on December 18. Fully 200 of the lambs were noticeably ill; many were coughing, and a considerable number had a profuse nasal discharge streaked with blood. Vaccine was ordered on this date and administered on the 21st.

December 28, three of the vaccinated lambs had died. Several still showed a discharge from the nose. January 5, three more had died since vaccination. Some were still sick. January 14, he had lost one the evening before. Post-mortem revealed bronchitis, hemorrhages in the lymph glands and many hemorrhages in the serous membranes. There were five lambs noticeably stiff and ill. One of them had a temperature of 105.8.

January 15, one more animal had died. Post-mortem showed numerous hemorrhages between the fore limb and thorax; many subpleural hemorrhages, some of considerable size. The lungs were spotted with hemorrhages. The trachea, bronchi and larynx extremely red and hemorrhagic. The thymus and prepectoral lymph glands were hemorrhagic and swollen. Prescapular lymph gland was normal. Spleen was swollen and black, with many subscapular hemorrhages. Several subperitoneal hemorrhages were noted. Mucous membrane of the fourth stomach was extremely reddened throughout. A rabbit inoculated subcutaneously with a lung emulsion from the sheep posted on January 14, died on the 28th, showing an extensive edematous lesion at the point of inoculation. Bouillon cultures made direct from the spleen and heart blood of the sheep posted on January 15 showed the presence of a bipolar organism; the one from the heart blood being a pure culture, whereas the one from the spleen was mixed with a larger bacillus, later determined to be colon.

January 22, the place was visited again. One lamb had been lost since the previous visit and several were coughing and discharging from the nose. Nine in all had been lost since vaccination.

February 12, the place was visited again, when it was found that four had been lost since the previous visit, making 13 in all since vaccination. One posted showed the usual bronchitis and hemorrhagic lymph glands. July 15, owner stated that 62 were lost altogether during the feeding season, making a loss of 22 head following vaccination. Apparently, in this case, a single vaccination was not successful in stopping the losses. A second vaccination was urged, but was refused by the owner.

LOT No. 12.

Consisting of 790 New Mexico lambs shipped to Windsor and arriving there on November 9. At the time of arrival two were dead in the car and several were scouring. They were visited on November 13, at which time 20 had been lost and as many more were noticeably sick. Many were scouring. No grain whatever had been fed. Post-mortem examination on several revealed a rather severe bronchitis and considerable inflammation in the pyloric end of the fourth stomach. Also inflammation of the first few inches of the duodenum. There was little pneumonia. No laboratory work was done on this outbreak. Vaccination, however, was recommended, and on November 17 approximately 770 lambs were vaccinated. On the 24th, it was stated that two had died since vaccination. By December 28, there had been no further loss.

LOT No. 13.

Consisting of 1,600 young and old sheep on a ranch near Canon City. They were visited by Dr. Charles G. Lamb, State Veterinarian, who reported that some 40 had been lost at the time he saw them. The thoracic and abdominal viscera was shipped to our laboratory, where it arrived on November 27. There was some pneumonia and considerable bronchitis. Smears made from the lungs showed a bipolar organism. A rabbit inoculated with a lung emulsion died on the night of November 30. Smears made from this rabbit showed a large number of bipolar bacilli. Cultures, however, became contaminated with colon bacilli and were finally discarded. Dr. Lamb reported that the symptoms were coughing, followed sometimes by vomiting. There was some discharge from the nose and the breathing was rapid and

labored. Some died within 24 hours after being noticed to be sick. Vaccination was recommended, both from the State Veterinarian's office and from our laboratory, but was not carried out. It was later reported that over 300 of these animals were lost.

LOT No. 14.

A lot consisting of 4,500 sheep on feed near Greeley. These animals had been shipped in from two different sources and at two different times. One lot of 2,100 were New Mexico lambs and had arrived in the pens November 10. Eleven days later the loss began. A local veterinarian was called on the 27th, at which time the loss had been rather heavy. Material was selected and brought to the laboratory at Fort Collins. Hemorrhages were very numerous throughout. Smears made direct from the various tissues brought showed the presence of a bipolar organism. A rabbit inoculated from an emulsion of the heart muscle on November 27 died on December 2. Smears showed bipolar bacilli. The place was visited by us on November 28, at which time some 40 were dead, 10 of which had died the night previously. Two animals were posted. The larynx, trachea and bronchi were extremely reddened and hemorrhagic, with some hemorrhages in the lungs. Subpleural hemorrhages were numerous, particularly along the intercostal arteries. There were large extravasations of blood over the diaphragm, subpericardial and subepicardial hemorrhages; considerable straw-colored fluid in the throax and abdomen; subserous hemorrhages on the spleen and on the intestines. The fourth stomach was deeply reddened throughout. The blood was of a peculiar purplish hue. Vaccine was ordered for the 2,100 and was administered on November 30, at which time 47 had died and 8 or 10 were noticeably ill. On December 4, the local veterinarian reported that six of the vaccinated sheep had died and that two in the other lot were dead. On December 8, 1,100 of the unvaccinated sheep were vaccinated. The owner reported at this time that only four of the vaccinated sheep had died. On December 12, vaccination was finished on the entire flock of 4,500. December 26, it was reported that there had been no further losses.

LOT No. 15.

In the vicinity of Monte Vista, consisting of 1,600 head, had been on pea fields for three months. About 60 head had been lost at the time of our visit, December 22. Symptoms were as follows: They would become delirious, get down, and lie sometimes for several days. Sometimes they would die at once. The

owner stated that a few days before he had changed from a heavy field of peas to a light one and that since that time there had been little loss. However, we found two that were ill and three that had died the night before. The two ill ones were slaughtered for examination, but one showed no lesions whatever, whereas the other showed a severe inflammation of the fourth stomach. The three dead ones showed a rather extreme tracheitis and bronchitis, with hemorrhagic lymph gland and thymus, subepicardial hemorrhages, the stomach and intestines normal. A rabbit inoculated subcutaneously with a lung emulsion from one of these animals remained healthy. Smears did not show bipolar organisms. January 2, this lot was visited by the local veterinarian, at which time about 80 head had been lost. The loss had been so heavy that the owners had decided to ship to market, but, owing to their inability to get cars, some 800 were left in the field; 506 of these were vaccinated, and 300 were left unvaccinated. By January 11, nine days later, 12 had been lost out of the vaccinated lot and eight out of the unvaccinated. On this date all were shipped, so that our records are unfortunately incomplete.

COMMENT.

The above series indicated to us that the grain food had little to do with the losses in question, since in only one of these cases were the animals on a grain ration which could in any way account for the condition. The finding of a bipolar organism that was virulent for rabbits and also the finding of many acute cases giving typical lesions of hemorrhagic septicemia made us feel that *B. ovisepticus* was responsible for much of our trouble. We appreciated the fact, of course, that the *B. ovisepticus* was alone probably not the deciding factor, but that when the sheep were exposed to untoward conditions, particularly when being shipped from one place to another, that this organism might set up just such conditions as we found. It was also possible that in transit they picked up a particularly virulent strain of the organism.

LOSSES IN PREGNANT EWES.

For some years we have had reported to us rather heavy losses in pregnant ewes, particularly at about lambing time. We have usually attributed this to the severity of the weather, lack of feed and other untoward conditions, and we still feel that these are a considerable factor. We shall detail some cases which we have visited during the past winter.

Lot No. 19.

Consisting of 1,500 head of ewes in the vicinity of Las Animas. They had been shipped from Routt County in October and had been kept in their present quarters since that time. They had not been dying rapidly, but altogether some 25 or 30 had been lost out of one pen containing about 500. They were beginning to lamb. The owner stated that only those ewes that had not yet lambed were affected. They had been visited by other veterinarians who were unable to find any very distinct lesions. At the time of our visit, there were 8 or 10 that were noticeably sick, 6 of which were lying on the ground in a comatose state. Some had lain in this condition for ten days or more. The ewes were being fed ensilage, which was blamed for the trouble. It had, however, been withheld from these 500 for over a week, but the others had been continued on it. They continued to die in the one lot and not in the other, indicating thereby that the ensilage was probably not the cause. Post-mortem examination on three or four of the animals that had lain in a comatose state revealed practically no lesions except emaciation. We were, however, informed that those ewes had been in a good state of flesh when taken sick. One that had died the night previous to our visit and was in a good state of flesh showed numerous lesions. There were laryngitis, tracheitis, bronchitis, solidfication of the lower portion of the apical and cardiac lobes of the lungs, subpleural and subepicardial hemorrhages and an extreme reddening throughout the mucous membrane of the abomasum. Kidneys appeared congested and the lymph glands were swollen and hemorrhagic. There was a single fetus in the uterus.

Material from this animal was brought to the laboratory at Fort Collins, where an emulsion was made of the lung and heart blood and inoculated intraperitoneally into one guinea pig and one rabbit, and subcutaneously into one rabbit, 1 c.c. in each case. Ten c.c. of the same material was given intrajugularly to a yearling lamb. These inoculations were made on March 2, 1918. By 10 o'clock the next morning, the rabbit that had been inoculated intraperitoneally and the guinea pig were dead. By the following day the rabbit inoculated subcutaneously was dead. Cultures from these rabbits and the pig gave us a small oval gram negative bipolar staining organism. The inoculated sheep died on March 12. The inoculated sheep developed as follows:

March 4, 1918—Temperature, 104.2. Looks well.

March 5, 1918—Temperature, 105.2. Has good appetite and looks well.

March 6, 1918—Temperature, 103.6. Eating.

March 7, 1918—Temperature, 107.

March 8, 1918—Temperature, 105.4.

March 9, 1918—Temperature, 106.2.

March 10, 1918—Temperature at 9:30 a. m., 106; 5:45 p. m., 102. Not eating.

March 11, 1918—Temperature 8:30 a. m., 105.5. Not eating. 4:45 p. m., 105. Dull. Not eating. Lying down most of the time.

March 12, 1918. Temperature, 104. Very dull. Breathing labored. Lies most of the time. Not eating. 3:45 p. m., died.

Post-mortem examination made within 30 minutes of death as follows: Several hemorrhages on either side of the lower portion of the thorax. All lymph glands appeared normal. Larynx normal, trachea slightly injected. Two or three small abscesses in left lung, with correspondingly inflamed areas on costal pleura. A considerable number of pin point hemorrhages throughout right lung. Left pleura showed advanced suppurative pleuritis throughout its entire surface. A considerable amount of ill smelling fluid in the left pleural cavity. Many subepicardial hemorrhages practically covering the whole ventricular surface of the heart. The leaves of the fourth stomach were deeply reddened, but the walls appeared normal. Duodenum was deeply reddened for several inches. A rabbit inoculated intravenously from emulsion of the lung of this animal was found dead the next morning. Cultures from this rabbit showed the presence of a bipolar gram negative organism.

Vaccination of the ewes was recommended and carried out by the local veterinarian and reported as follows: 1,301 sheep were vaccinated, after a loss of 46, with 6 sick at the time of vaccination. Of these 6, 5 died subsequently. No animals sickened for a period of two weeks following vaccination, at which time the disease appeared to break out with more virulence than ever, when 20 died within a week. Two hundred and eighty-seven of this lot were revaccinated at the end of the third week, using 1 c.c. per dose. Of the 943 which were not vaccinated, 10 were lost. The records of those revaccinated are as yet incomplete.

LOT No. 18.

A lot of approximately 500 lambing ewes had been shipped from Routt County in October, 1917. In November a few had been lost, but they stopped dying until January, since which

time the loss has been approximately 35. They were visited on March 1, 1918. The owner had previously written describing the symptoms. He had said that they showed delirium, threw the head back as though there was some brain disturbance. Temperatures on the sick sheep varied from 102 to 104. There were 8 or 10 noticeably ill at the time of our visit. Four animals were posted, two of which were slaughtered for the examination. Those that were slaughtered showed few lesions. One of the dead ones had undergone such decomposition that nothing satisfactory could be determined. The other, however, showed practically the same lesions as the one described under Lot No. 19, except that there was no pneumonia. The heart and lungs were brought to the laboratory, where, on March 2, 1 c.c. of a lung and heart blood emulsion was given intraperitoneally into a guinea pig and a rabbit, and 10 c.c. intrajugularly into a lamb, weight 55 pounds. By 10 o'clock the next morning, March 3, all three of these inoculated animals were dead. Cultures from all three revealed typical bipolar organisms, as did the smears. Post-mortem on the lamb revealed the following: Many subcutaneous hemorrhages. Both prescapular lymph glands deeply reddened, swollen and hemorrhagic. Trachea and bronchial tubes were deeply reddened and a few subpleural hemorrhages in the lungs. Subpleural hemorrhages numerous along either side of the spine and in the intercostal spaces and also along the sternum. The heart, particularly at the auriculo-ventricular groove, was studded with hemorrhages. The fourth stomach was deeply reddened throughout its mucous membrane, as was also the first few inches of the duodenum. Kidneys were congested and there were a few small hemorrhages on the outer surface of the bladder.

A sheep was inoculated intrajugularly with 10 c.c. of a suspension of the heart blood of the above lamb, also a rabbit intraperitoneally with 1 c.c. of the same material. The rabbit died on the 8th, culture from which revealed the usual bipolar organism.

The record of the inoculated sheep is as follows:

March 5, 1918—Temperature, 104. Looks well.

March 6, 1918—Temperature, 103.8.

March 7, 1918—Temperature, 105.5.

March 8, 1918—Temperature, 106.2.

March 9, 1918—Temperature, 103.8.

March 10, 1918—Temperature, 104.3 at 9:30 a. m., 105.6 at 5:45 p. m.

March 11, 1918—Temperature, 103.4 at 8:30 a. m., 104.8 at 4:45 p. m.

March 12, 1918—Temperature, 103.7.

The temperature varied between 103 and 104 until March 24, 1918, when it was not further taken. The sheep appeared entirely healthy.

Cultures from this outbreak were used for later work which will appear in a separate place.

Four hundred and twenty-five of these sheep were vaccinated, at which time 7 were ill and 40 had died. Six of the sick ones died following vaccination. No further ones sickened for two weeks. During the third week, the disease broke out again and 12 head died. Two hundred and thirty-five were revaccinated. Four or five were sick at the time of revaccination, all of which died, but none has sickened or died since.

(TO BE CONTINUED.)

ADDRESS.*

Chairman J. G. WILLS, Albany, New York.

(Section on Sanitary Science and Police.)*

We have again gathered to consider matters pertaining to sanitary science and police measures for the control of the infectious diseases of domestic animals.

The attitude of those present will, no doubt, have considerable bearing on future measures and regulations for the elimination of these important maladies from our flocks and herds.

In these times, with so many thousands of men and women taken from their usual occupations and placed under new and strange surroundings, many of them in destructive rather than constructive activities, it becomes necessary to conserve more carefully both plant and animal life in order that our people be fed. Under such circumstances it is most important that we secure the maximum animal production.

We, as members of a profession intimately connected with a great industry, are in a favorable position to render efficient service at this important period. Favorable conditions exist for unscrupulous persons taking advantage of the existing diminution in the number of practicing veterinarians and to attempt to introduce among our live stock such infections as foot and mouth, contagious pleuro pneumonia, or rinderpest. Our enemies

* 55th Annual Meeting, A. V. M. A., Philadelphia, 1918.

could cripple our animal industry, particularly in relation to the production of meat and leather, in no more effective way than by deliberate distribution of the virus of some of the most serious infections in large breeding communities. The veterinary profession, as well as those allied with it, are not in position to meet such a contingency at this time as effectively as under ordinary conditions. Our already overburdened government and state sanitarians, as well as the practitioner, are so occupied with the ordinary abnormalities of live stock that any additional demands upon them could not be well met at this time. It is consequently important that we be especially vigilant to guard against these dangers, using every means to avoid such a possibility, rather than be placed at a disadvantage by attempting to check it after it appears. Our live stock industry demands the fullest possible protection from such attacks at this time, since the demands upon us for meat, milk, wool and leather are so great that each preventable loss adds to the burden of ourselves and our allies. Every productive animal removed from economic usefulness affects, to some extent, the situation here or abroad. It may be a reduction in food, in clothing or in some item of equipment, and in itself may be infinitestimal in extent, but if we multiply the one by thousands or tens of thousands it becomes a serious menace to many essential industries vital to the welfare of the country.

The systematic reduction in the number of animals dying or becoming inefficient in production, due to preventable disease or injury, has come to be one of the most important functions of the veterinarian. The prophylactic features of his work have become more important than formerly, when treating the sick rather than preventing their becoming so was looked upon as the chief function of medicinal practice.

This Association is in a position to render great service in connection with increasing food production, as well as in control of the infectious diseases of animals. Its membership, covering every section of the country and comprising every branch of the profession, is most representative. Our influence upon animal owners has much to do with the increase in live stock production, which at this time is most important.

The future of animal industry looks very encouraging at this time. This country must become the principal market for breeding animals to replenish the decimated herds of continental Europe.

Our animals must furnish the seed stock for those countries where war has caused the destruction of native herds. We are in a position to command an important position from a business standpoint, if we can furnish purchasers good stock, give them reasonable assurance of freedom from disease at prices that will attract buyers from other countries. Cattle, horses, sheep, swine, poultry, and, in fact, every kind of farm animal, will be in demand. Our position as a stock-raising nation will be enhanced by the responsibilities we will be called upon to meet.

It is a foregone conclusion that our prestige in this connection will be largely in proportion to the efficiency of our work as veterinarians and sanitarians in eliminating diseases in our domestic animals. Our responsibility as professional men makes necessary the control of these maladies through scientific rather than haphazard methods.

By closer association with stock owners and breeders we may do much to bring this profession into closer coöperation with those who are so intimately associated with us.

It is upon those who have left their homes and business, often at a great sacrifice, that we must depend for the upbuilding of the profession in the army and the control of diseases among animals used for military purposes which have such an important bearing on the successful prosecution of the war. We have cause to feel justly proud of the personnel of the Army Veterinary Corps and those who have made possible this efficient organization should receive the commendation of this Association in every possible way.

We will now pass to the regular program provided for this Section on Sanitary Science and Police.

PRACTICAL METHODS OF TREATMENT FOR WORM INFESTATION.*

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This paper will deal as briefly as possible with a dozen of the more important worm parasites affecting horses, cattle, sheep, swine, dogs, cats and poultry. It will approve the use of perhaps a half-dozen drugs. It will deal with nematode worms primarily. In the belief of the writer, this is a practical paper. There is a

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disposition among practitioners to regard laboratory men as impractical. As a laboratory man, it is the writer's belief that as regards the use of anthelmintics the practitioner is frequently highly impractical in that he often uses inefficient measures in place of equally feasible effective ones. The determination of the value of anthelmintic medication in practice is not always a simple and certain procedure. Under what we may call barnyard, stable, hog-pen and kennel conditions, it is not always easy to ascertain what worms are passed. There are too many complications. The manure of one animal is mixed with that of other animals, and that of one day with that of other days. The farmer or the stable hand is commonly uncertain as to just what has happened and neither their observation nor their judgment can be trusted in many cases. The technique of examination necessary under such circumstances is crude and unsatisfactory. Poking in the manure with a stick gives a minimum amount of information. The number of worms passed may sometimes be ascertained or guessed at, if the worms happen to be large ones, but the number left cannot be readily ascertained and clinical evidence of recovery from a sub-chronic afebrile state of malnutrition and impoverishment, such as is commonly present in clinical cases of parasitism, comes slowly and such evidence can seldom be sought for by the busy practitioner. Under these circumstances, drugs of but little anthelmintic value become established as anthelmintics. Strictly speaking, treatment with such drugs is not practical treatment.

These are conditions practically inseparable from the practice of veterinary medicine and no criticism can be fairly leveled at the practitioner on that score. What we need in this case are dependable anthelmintics, with an efficiency established by numerous tests under experimental conditions. This is the task of the laboratory man. It is a task that has been undertaken, but only a small part of the work has yet been done. Part of what I may say today will probably prove to be premature in the light of what we will know next year, but if we waited till we knew everything about a subject before telling it, rather than tell the little we know, our progress might be surer, but it would undoubtedly be much slower.

Critical laboratory tests of numerous reputed anthelmintics, and there are hundreds of substances that have had anthelmintic value claimed for them, show that most of the anthelmintics have less value, often much less, than is commonly assigned to them,

while a few prove on critical test to have the value which clinical evidence has attributed to them. These results naturally lead to skepticism in regard to the actual value of untested anthelmintics. By a critical test I mean the administration of the drug to experiment animals under fixed conditions, the subsequent collection of all feces passed, the careful collection of worms from such feces daily for a period of four or more days, and, finally, the killing of the experiment animal at the end of the experiment and the post-mortem collection of all parasites not removed in order to ascertain where the treatment failed, as well as where it succeeded. Most of the recommendations I wish to make are based on such tests, and where they are not, I make my recommendations with reservations.

The horse is infested with a number of worms, of which we will consider only the strongyles, pinworms and ascarids.

The strongyles of the horse include several genera, but the two genera of importance in the large intestine are the genus *Strongylus,* sometimes called *Sclerostomum* (the large red palisade worms), and the genus *Cylicostomum,* also called *Cylichnostomum* and *Trichonema* (the small worm from the large intestine). The latter genus includes a rather large number of species which have been lumped under the name *Strongylus tetracanthus* or *Sclerostomum tetracanthum.* There are 3 species of *Strongylus* commonly present in horses, *Strongylus equinus, S. edentatus* and *S. vulgaris.* Species of both genera are commonly present in the same animal and often in large numbers. The disease due to the presence of the strongyles of both genera has been called stronglidosis by Leneveu. It is an afebrile, wasting disease, characterized by digestive disorders, debility, anemia and edema, and complicated by the many serious sequelæ resulting from aneurism production by *S. vulgaris.*

The importance of our horses for cavalry, field artillery and transport purposes at this time, the value of these horses by the time they arrive in France, and the prevalence of strongylidosis make the subject of treatment for this disease a matter well worthy of our consideration.

It is generally understood that these worms are hard to remove, and on that point the veterinary practitioner and the parasitologist are in agreement. It is, therefore, somewhat surprising to learn that, on the contrary, these worms are not particularly difficult to remove. In tests which I made in collaboration with Dr. R. H. Wilson and Mr. Meyer Wigdor, we

obtained very high anthelmintic efficacy in the treatment of strongylidosis. The results of our experiments are detailed in a paper which is already in press, but I will give a synopsis of those results here.

We secured the removal of every *Strongylus,* 107 of them, from a horse that had fasted over 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 96 per cent of the *Strongylus* present, 66 out of 69, from a horse that had fasted over 24 hours, by the administration of 16 mils of oil of chenopodium, followed 2 hours later by a quart of linseed oil. We removed 95 per cent of the *Strongylus* present, 78 out of 82, from a horse that had been fasted over 24 hours, by the administration of 3 6-mil doses of oil of chenopodium at hour intervals, followed an hour after the last dose by a liter of linseed oil. We removed 76 per cent of the *Strongylus* present, 61 out of 80, from a horse that had been fasted less than 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 48 per cent of the *Strongylus* present, 102 out of 214, from a horse that had been fasted less than 24 hours, by the administration of 2 ounces of turpentine in a quart of linseed oil. We removed less than 1 per cent of the *Strongylus* present from one horse that received 18 mils of oil of chenopodium and a quart of linseed oil after fasting less than 24 hours; from a second horse that received 18 mils of oil of chenopodium and a quart of linseed oil after fasting less than 24 hours; from a third horse that received 8 mils of oil of chenopodium and a quart of linseed oil after fasting 24 hours; from a fourth horse that received 2 drams of tartar emetic in a mash daily for 5 days; and from a fifth horse that received 2 drams of iron sulphate in a mash daily for 7 days. The foregoing shows that 96 and 100 per cent efficacy were secured by the use of 16 mils of oil of chenopodium, followed immediately or 2 hours later by a quart of linseed oil, in animals that had been fasted over 24 hours. In these cases, the horses were given a light feed in the evening and all hay and bedding removed. No food was given the next day. The next day the treatment was given early in the morning and the animal not fed for 3 hours afterward. Where animals were fed the morning before treatment, equally good results were not obtained.

With approximately the same size of dose, the efficacy fell to 76 per cent in one case and less than 1 per cent in another. With

smaller doses, 10 mils and 8 mils, the efficacy remained below 1 per cent. It would appear from this that doses of about 16 mils of oil of chenopodium were needed and that the animal should be fasted over a period of almost 36 hours to insure the best results. The one experiment with turpentine, securing in 2-ounce dose in a quart of linseed oil the removal of 48 per cent of the *Strongylus* present in a horse fasted for less than 24 hours, indicates that we have in turpentine a fairly effective substitute for oil of chenopodium when the latter is unobtainable.

Some experiments I performed previous to the experiments noted above bear out our findings in a general way. Horse No. 1 was given 8 mils of oil of chenopodium, followed immediately by a liter of linseed oil, after fasting for less than 24 hours. The treatment removed 51 per cent of the *Strongylus* present, 19 out of 37. Horse No. 2 was given 16 mils of oil of chenopodium, followed immediately by 800 mils of linseed oil, and 100 mils of castor oil, after fasting for 24 hours. The treatment failed to remove any *Strongylus*. Fifteen days later this horse was given 20 mils of chloroform, followed in 15 minutes by 750 mils of linseed oil. The animal had been given some feed shortly before treatment. This treatment also failed to remove any *Strongylus*. The animal was killed 6 days later and found to have 3 *Strongylus* in the cecum. The explanation for the failure of treatment here probably lies in the presence of a very small number of *Strongylus*, perhaps safe in a remote part of the cecum. Horse No. 3 was given 12 mils of oil of chenopodium, followed by 800 mils of linseed oil, after fasting for 24 hours. The treatment failed to remove any *Strongylus*. Six days later the horse was given 2 doses of 20 mils each of carbon bisulphide at a 2-hour interval, followed by 800 mils of linseed oil two and a half hours later. This treatment failed to remove any *Strongylus*. Eight days later the horse was given 3 doses of carbon bisulphide, 3 drams to the dose, at hour intervals. Sixteen days later the animal was killed and found to have 12 *Strongylus* in the cecum. The failure of the treatment here may have been due to the size of the dose, the fasting period, the presence of a few *Strongylus* in a remote portion of the cecum, or to the development of sexually mature forms from agamic worms attaining the intestine between the time of treatment and the time of death. Horse No. 4 was given 20 mils of carbon bisulphide, followed by 800 mils of castor oil one and a half hours later. The treatment failed to remove any *Strongylus*. Five days later the horse was

given 12 mils of oil of chenopodium, followed immediately by 800 mils of linseed oil. The horse passed one *Strongylus*. Seven days later the horse was given 3 doses of carbon bisulphide, of 3 drams each, at hour intervals. No worms were passed and the animal was killed 10 days later. There were 13 *Strongylus* postmortem, so the treatment with chenopodium was 7 per cent effective and those with carbon bisulphide entire failures.

So far as conclusions may be drawn from the 14 experiments noted here, and we must draw what conclusions we may, since this represents almost the entire body of dependable tests available to date, we may say that apparently *Strongylus* may be removed from horses with a rather high degree of certainty with doses of 16 to 18 mils of oil of chenopodium, followed immediately or after an interval by a quart or more of linseed oil, provided the animals have been fasted for a period of 36 hours. It would perhaps be good practice to repeat the treatment at an interval of 2 weeks.

The removal of *Cylicostomum* was even more readily accomplished in our experiments. We secured the removal of every *Cylicostomum* from 4 horses. In one of these cases the horse fasted less than 24 hours, received 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil, and passed 70 *Cylicostomum;* in another case the horse fasted over 24 hours, received 16 mils of oil of chenopodium, followed 2 hours later by a quart of linseed oil, and passed 540 *Cylicostomum;* in the third case the horse fasted over 24 hours, received 3 6-mil doses of oil of chenopodium at hour intervals, followed an hour after the last dose by a liter of linseed oil, and passed 1,242 *Cylicostomum;* in the fourth case the horse fasted less than 24 hours, received 2 ounces of turpentine in a quart of linseed oil, and passed 274 *Cylicostomum*. We removed 97 per cent of the *Cylicostomum* present (or perhaps 100 per cent, if these larval forms had issued from their cysts in the mucosa after the passage of the anthelmintic, as seems likely), 77 out of 79, or 77 out of 77, as the case may be, from a horse that had been fasted over 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 29 per cent of the *Cylicostomum* present, 187 out of 635, from a horse that had been fed shortly before treatment, by the administration of 10 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 11 per cent of the *Cylicostomum* present, 428 out of 3,623, from a horse that had been fasted less than 24

hours, by the administration of 18 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed less than 1 per cent of the *Cylicostomum* present from 1 horse that received 8 mils of oil of chenopodium, followed immediately by a quart of linseed oil, after fasting less than 24 hours; from a second horse that received 2 drams of tartar emetic in a mash daily for 5 days; and from a third horse that received 2 drams of iron sulphate in a mash daily for 7 days.

From the foregoing it may be concluded that in amounts of 16 to 18 mils oil of chenopodium in 1 to 3 doses, followed immediately or at an interval by linseed oil, may be expected to remove all or nearly all strongyles from the cecum and colon of the horse in many cases, provided the animal is fasted 36 hours previous to treatment.

Infestation with *Oxyuris equi*, or pinworm, is not an uncommon condition in horses and may be suspected when horses are seen rubbing the tail against some object or when such a practice is indicated by the presence of a bare spot where the hair has been rubbed off the tail near its root. The presence of these worms may also be suspected when yellowish egg masses are found around the anus, as a result of the crushing of the gravid female by the anal sphincter. In a recent paper, the eminent French parasitologist, Railliet (1917) states that this worm is readily removed. He notes the use of internal medication by mouth, but believes that the easy way to remove pinworms from the horse is by means of copious enemata of warm, soapy water or vinegar water, to which may be added corrosive sublimate to make a 1:2000 solution, or a mucilaginous emulsion of thymol, the enemata to be repeated as often as necessary. The treatments noted by Railliet as used in oral medication are as follows: Tartar emetic in doses of 15 to 20 grams in food; corrosive sublimate in doses of a deciliter of a 1:1000 solution daily in drink or food for about 15 days; areca nut, freshly ground, in 100-gram doses; and thymol, in 15- or 20-gram doses, suspended in mucilage.

In our experience, the removal of pinworms by means of oral medication was very easily accomplished, as a rule. In the tests in collaboration with Wilson and Wigdor, we removed 100 per cent of the pinworms present in 5 horses by the following treatments: Oil of chenopodium, 16 mils, followed immediately by a quart of linseed oil, the horse being fasted for over 24 hours; oil of chenopodium, 16 mils, followed 2 hours later by a quart

of linseed oil, the horse being fasted over 24 hours; oil of chenopodium, 3 6-mil doses at hour intervals, followed an hour after the last dose by a liter of linseed oil, the horse being fasted for over 24 hours; turpentine, 2 ounces, followed immediately by a quart of linseed oil, the horse being fasted less than 24 hours; and by tartar emetic, 2 drams daily in the feed for 5 days. We failed entirely to remove the few pinworms present in 2 cases. In one of these cases the horse received 18 mils of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted less than 24 hours; in the other case the horse received 2 drams of iron sulphate daily in the feed for 7 days.

The above experiments confirm the idea expressed by Railliet as to the readiness with which pinworms may be removed. They may be cleaned out by oil of chenopodium in 16-mil doses, followed immediately or after an interval by a quart of linseed oil, in horses that have been fasted over 24 hours, by 2 ounces of turpentine, followed immediately by a quart of linseed oil in horses that have fasted less than 24 hours, or by 2-dram doses of tartar emetic in the feed daily for 5 days. So far as we can judge from so few experiments, fasting less than 24 hours interferes with the efficacy of oil of chenopodium against these worms, and iron sulphate in 2-dram doses daily for 7 days is unsatisfactory.

The writer has been under the impression for some years that the removal of ascarids, the large maw-worms, of the horse should present no special difficulties, since ascarids in man, dogs and swine yield so readily to treatment. However, test of treatments have led to the conclusion that Neveau-Lemaire (1912) was quite right in stating that none of the numerous treatments commonly employed, such as tartar emetic, turpentine, santonica, empyreumatic oil, and benzine, give satisfactory results. We failed to remove any ascarids from 4 infested animals treated as follows: One horse received 8 mils of oil of chenopodium, another 10 mils, and a third 16 mils, the chenopodium being followed immediately by a quart of linseed oil; the fourth horse received 2 ounces of turpentine, followed immediately by a quart of linseed oil. All of these horses were fasted less than 24 hours. A horse which received 2 drams of tartar emetic in feed daily for 5 days passed 8 per cent of its ascarids; one that received 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted over 24 hours, passed 3 per cent of its ascarids; one that received 18 mils of oil of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted less than

24 hours, passed 12 per cent of its ascarids; and one that received 3 6-mil doses of oil of chenopodium, followed an hour after the last dose by a liter of linseed oil, the horse being fasted over 24 hours, passed 25 per cent of its ascarids.

In view of the above results, the writer is unable to make recommendations in regard to treatment for ascarids in the horse. Numerous treatments are known to me, and are said to be effective. Doubtless some of these treatments are effective, at least at times, but until their value has been experimentally demonstrated I would feel no confidence in them personally and would prefer to suspend judgment on this topic pending further investigation. Chenopodium is specifically ascaricidal in man, dogs and swine, and has a very high anthelmintic value. Its low efficacy against ascarids in the horse, in the dose used and in the way it was given, was a surprise. It is possible that a variation in dosage or mode of administration, such as giving a larger number of fractional doses over a longer period, may secure satisfactory results. I have found such consideration necessary in securing a satisfactory chenopodium treatment for hookworm in the dog, but given such consideration a satisfactory treatment is possible. Railliet (1915) says the preference among practitioners is for tartar emetic or arsenic to remove ascarids from the horse. Tartar emetic has the disadvantage of being a severe gastro-intestinal irritant and dangerous. Experimentally, I have found treatment with repeated doses of arsenic a slow and not very certain procedure.

As far as cattle are concerned, the only parasite I care to touch on at this time is stomach worm. This is the same worm that infests sheep, and just as the stomach worm does the greatest damage to lambs among sheep, so it does its greatest damage to calves among cattle. In districts where stomach worms are plentiful in sheep, it is practically certain that they will be plentiful in cattle, and under these circumstances calves should be treated for stomach worm. Experimental tests to determine the efficacy of treatments and the doses required are lacking as far as stomach worm in cattle is concerned. However, we know that the copper sulphate treatment is highly efficacious and safe against stomach worm in sheep, and we may assume that the same treatment would be efficacious and safe against stomach worms in another ruminant in the appropriate dose, which dose can be computed reasonably well from the dose for a sheep. I prefer safe and conservative doses, repeated at long enough

intervals to allow subsiding of inflammation and to avoid cumulative effects, to large doses. So I would start my dose for calves around 100 mils of 1 per cent solution in water for animals 2 to 3 months old, grading the dose up conservatively from this point, and repeating treatment at intervals of a month or 6 weeks from spring until after frost. The dose can be given with a metal dose syringe to calves under proper restraint or if the number warrants it, more elaborate devices for administering the dose may be used.

Stomach worm in sheep is a well-known and serious pest. There are a number of treatments which have been recommended, among which may be mentioned the gasoline treatment, the creosote treatment and the copper sulphate treatment. In my opinion, the fact that gasoline is volatile and apt to enter the lungs and that it must be given three times in such comparatively expensive vehicles as milk, and in large amounts, precludes its use so long as there is anything else that is free from these drawbacks. Most of the experiments on which I base my objection to gasoline and creosote have been published by Hall and Foster (1918). In the same paper will be found the experiments showing the advantages and efficacy of the copper sulphate treatment.

The copper sulphate treatment for stomach worms in sheep was devised by Hutcheon in South Africa and was very thoroughly tested. His reports cover the administration of the treatment to 23,000 sheep and show the good clinical results and the freedom from worms postmortem of sheep so treated. Our work in the Bureau of Animal Industry convinced us of the excellence of this treatment. Hall and Foster (1918) noted the use of 50-mil doses for lambs under 12 months old and 100 mils for those older, and described and figured an apparatus for administering the treatment. I am under the impression, based on our experiments and on some additional evidence obtained in Virginia and in Michigan in the control of stomach worms in sheep and goats, that stomach worms can be readily kept under control, at a point where it will have no discernible effect on the health of the sheep and perhaps even be eradicated from the range involved, by the administration of 50 mils of 1 per cent solution of copper sulphate every month or so except during the winter in localities where winter means freezing weather.

I have modified the apparatus originally described by Hall and Foster and now use this modification. This uses a shorter,

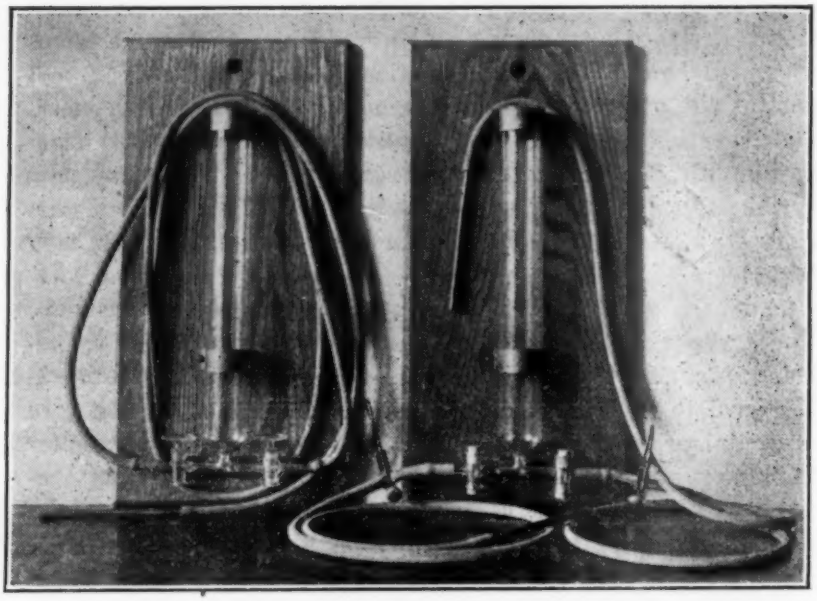

Fig. 1. Apparatus for drenching sheep for stomach worm. The apparatus at the right is the one with clip control on tubing.

thicker tube for the sake of compactness, is mounted on a board for the sake of convenience in hanging it up and in protecting the glass, has the inlet and outlet in glass as an integral part of the construction, partly for the sake of appearances and partly for the increased efficacy. Some earlier modifications use a glass control valve (Fig. 1), but this was too fragile and the present apparatus, like the original, uses the clamp on the rubber tube. All apparatus is fed from a reservoir through one tube and delivers the dose to a metal tube, which is inserted in the sheep's mouth.

It is commonly stated by authorities that the copper sulphate crystals used in making this solution must be clear blue crystals, those having white patches or crusts on them to be rejected. In looking over my papers, I do not find the reason for this. I have heard some reasons assigned, among others that the white patches were oxidized or insoluble, which is not the case, as the white patches represent copper sulphate which has lost part of its water of crystallization through efflorescence on exposure to air. Another reason which might be assigned, and this is perhaps the true reason, is that the loss of this water makes a difference in the amount of copper sulphate necessary in making up a solution,

so that the weight of blue crystals, containing a rather large amount of actual $CuSO_4$ as the same weight of whitish material containing less water of crystallization. The fresh blue crystals of copper sulphate are $CuSO_4$, $5H_2O$; on exposure to air the light-colored patches form and these have the formula $CuSO_4$, $2H_2O$. At 100 C., $CuSO_4$, H_2O is formed and at red heat $CuSO_4$. The differences in weight of these various forms of copper sulphate make considerable difference in the amount required to make a 1 per cent solution or any given strength. Thus to make a quart of the 1 per cent solution would require 0.946 gm. of the blue crystals, 0.747 gm. of the blue white powder formed on the crystals by efflorescence, or 0.6 gm. of the anhydrous copper sulphate formed at red heat. Hence in making a solution, it is important to know what strength is being made, and one should use only one sort of copper sulphate to insure this. The copper sulphate solution resulting, if of the required strength, will be the same, no matter what form of the salt is used.

Nodular worm infestation in sheep is a serious disease which I mention only to express the opinion that we have not as yet established a really satisfactory treatment for it. In our experiments in the Bureau of Animal Industry, Hall and Foster found an efficacy of 17 per cent for chloroform and castor oil, 16 per cent for gasoline in milk, 9 per cent for chenopodium, 0.6 per cent for copper sulphate solution, and 0 per cent for powdered copper sulphate in capsule, and petroleum benzin in milk. The presence of the complex ruminant stomach and the fact that the adult nodular worm is in the cecum and colon remote from the mouth are facts that make oral medication for nodular worm a difficult matter. The bulk of the injury due to the worm is done in the larval stage, so that the removal of the adult worm, if accomplished, probably does little for the sheep, unless the anthelmintic treatment is part of an eradication program contemplating adequate prophylaxis as well. Rectal medication might be used for the removal of the adult worms, but this is a slow procedure and less apt to be practical than oral medication.

Railliet (1915) notes the use of such a method by Brumpt. A preliminary dose of 25-30 gms. of sulphate of soda is given to the sheep to render the stools fluid. This being accomplished, the sheep is suspended by its hind legs and given a rectal injection of 1-1½ liters of water containing a thymol emulsion with the thymol at the rate of 1 gm. for each 3-5 kilos of weight of sheep; the anus is then held closed and the abdomen manipulated in

such a way as to make the lavage penetrate and rinse out the intestine. This method is perhaps suitable for the patient workers of Europe with their sheep scattered in small flocks over many holdings, but it is not well adapted to the American temperament or the large flocks in this country.

The worm which is most generally recognized as a common drawback to swine-raising is the ascarid. These worms are extremely common in swine and are often present in large numbers. They are large worms and frequently may be seen in the intestines of swine at abattoirs in such numbers as to distend the small intestine, forming a sort of sausage with worms for the stuffing. In the experiment work carried on at Washington, chenopodium was found superior to any other drug for the removal of these worms. Oil of chenopodium may be used in about this dosage: Give pigs 1 mil of the oil for every 25 pounds of weight of pig up to 8 mils, following the dose immediately by a purgative, such as an ounce of castor oil for animals weighing up to 100 pounds, and double this amount for those weighing over 100 pounds. Be sure the animal is fasted a full 24 hours before treatment and not fed for two or three hours after treatment. The writer has seen abundant evidence of the necessity for observing this rule. Restraint for pigs is a more or less vexatious problem, but Foster found that he could dose 176 hogs in an 8-hour day, the animals ranging in size from young pigs to large boars and brood sows. We dosed pigs by pulling the jaws apart with two loops of heavy wire or rope. Another method which is used is to put one end of a short piece of old rubber garden hose in the pig's mouth and pour the dose through the hose as the pig chews on it.

While on this topic of dosing pigs, the writer would like to again express the idea that mineral mixtures and stock tonics are inadequate and unsatisfactory substitutes for anthelmintic treatment. Experiments by Foster and myself in the Bureau of Animal Industry convinced us that mixtures of charcoal, lime, ashes, iron sulphate and such ingredients were of no value in removing worms or preventing worm infestation in swine, but the Bureau did not see fit to publish our conclusions. The reason which was given me for this was that these mineral mixtures were valuable in the bodily economy of the pig and that if the farmer learned that they did not remove worms he might quit using them. This reasoning did not appeal to me at the time and does not appeal to me at this time. If a farmer wishes to feed

mineral mixtures for the value of the mineral food content, he should do so, but he should not invest time or money in such mixtures for the purpose of clearing out or preventing worm infestations. If he does, he allows his pigs to remain wormy when they should be relieved from worms and puts money into something he may not need or want.

In the same category as the mineral mixture are most of the so-called stock tonics. Of these products, the Michigan Dairy and Food Department says:

"In recent years agricultural papers have been filled with advertisements of various stock tonics. * * * Wherever careful experimental trials have been made under expert and disinterested supervision * * * the outcome has invariably been that the use of condimental feeds as feeds was problematical and without material effect on production."

The products are about as ineffective in controlling worms. I fed one of the best known stock tonics to a 10-kilo dog, giving 14 doses in 16 days, using the dose for a 500-pound hog. In that period the dog passed 17 per cent of its ascarids and no *Dipylidium*. At the same rate it would have required 3 months to free the dog of its ascarids. Had it been given in food, as it was supposed to be, it would have been much less effective. Another well-known stock tonic was fed to a 10-kilo dog daily in the dose for a 100-pound hog. As this tonic is 95 per cent common table salt, the dog was unable to keep it down, so after 3 days' vomiting the dose was cut in half, and given daily for 14 days. No worms were passed, and the treatment was a failure. Another tonic for hogs was given to a 14.5-kilo dog, in the dose for a 50- to 75-pound pig, giving 27 doses in 32 days, or double the number said to be necessary. This treatment was 6 per cent effective against ascarids and removed no *Taenia*. To be sure, a dog is not a hog, but the evidence as to anthelmintic ineffectiveness is none the less relevent.

Stock tonics must be safe for general use. Anthelmintics are not safe for general use, as a rule, if they are potent. Hence, stock tonics seldom contain the amounts of potent anthelmintics necessary to accomplish much.

The writer has been testing anthelmintics on dogs for three years and has made tests on 400 dogs. As a result of this work, certain anthelmintics for dogs have been rather firmly established as satisfactory.

The dog ascarids may be easily eliminated by the use of oil of chenopodium administered in a single dose of 0.1 mil per kilo of weight of dog. The oil may be given without enclosing it in a capsule, but this causes a lot of salivation, a very tenacious saliva when the chenopodium is accompanied by castor oil, which is the way it should be given. Hard capsules may be used for the oil or the soft, elastic capsule. In my experimental work, I have found the soft capsule entirely satisfactory and prefer it to other forms of administering the drug. I use the dosage given by Hall (1917) when administering the soft capsules, namely, 5 minims to dogs weighing 10 pounds or less; 10 minims to dogs weighing 10 to 20 pounds; 15 minims to dogs weighing 20 to 30 pounds; not to exceed 20 minims to dogs weighing over 30 pounds; and for toy dogs, cut the dose to 2 or 3 minims. Give an ounce of castor oil to dogs other than toys, and give toys a half ounce; give the castor oil immediately after the chenopodium. This is important. Chenopodium is toxic, constipating and a gastro-intestinal irritant. Castor oil slows absorption and distributes it over a larger surface of the gastro-intestinal mucosa, and it promotes elimination. Dogs can be given double the minimum lethal dose of oil of chenopodium with castor oil and will survive, as Hall (1918) has already noted. If dogs show symptoms of poisoning, which is not apt to be the case when castor oil is given with the chenopodium, give more castor oil. The following are contraindications for oil of chenopodium—severe acute or chronic nephritis, organic heart trouble of certain types, marked cachexia, severe gastro-enteritis, and severe infectious diseases, especially distemper. Nephritis is extremely common in dogs, as we know from such work as that of Meyer (1911) and as our postmortem examinations constantly show. Normal kidneys are scarce, even in young dogs. Meyer notes that Siebel suggested that this condition was probably a sequel to distemper, that disease which seems always and everywhere present among dogs. The large amount of meat in a dog's diet may predispose to nephritis. Ordinarily, dogs with the customary chronic nephritis tolerate oil of chenopodium very well, but I have had one or two deaths among my dogs that I thought were due to the action of a therapeutic dose of chenopodium in causing an intensification of an already severe nephritis. Ziegler (1917) regards death from a lethal dose as due to acute nephritis; personally, I believe death is due to a combination of nephritis, gastro-enteritis and heart depression.

Organic heart trouble in dogs is rarely recognized or even looked for, and I have seen no cases where I could attribute the death of an animal to the presence of such a condition, but the fact that chenopodium acts terminally as a heart depressant indicates the danger in this quarter.

Cachexia in dogs is apt to be an accompaniment of parasitism, but it is a condition that calls for caution in the use of an anthelmintic. I have had a number of deaths occur from the use of therapeutic doses of chenopodium and other drugs in cachectic animals. Such animals should be put on a nourishing diet before treatment, but if it is necessary to administer anthelmintics immediately, use one which is not a gastro-intestinal irritant, if possible. For this purpose santonin is to be recommended. Santonin is not a drug which gives good results in single-dose treatments. Even when in large doses, and I have used such doses as a half-grain for every pound of weight of dog, santonin cannot be depended on to remove all the worms present. The correct way to use santonin, so far as tests indicate, is to give small doses daily for a number of days, then suspend treatment for a few days and repeat if necessary. I find experimentally that such treatment can be depended on to remove ascarids without setting up gastro-intestinal irritation. So far I have found santonin a very safe drug when given with an equal amount of calomel, and I have yet to see the first fatality from this combination. I gave one dog 61 grains of santonin and an equal amount of calomel in this way in 90 days; the animal lost some weight and lost hair around the eyes, neck, the axillæ and inguinal region and along the abdomen, but seemed in good health otherwise. Another dog was given 50½ grains in 18 days.

Gastro-enteritis is a contraindication for the use of oil of chenopodium for the reason that the oil is a gastro-intestinal irritant. It is a condition that occasionally complicates distemper.

Dogs suffering from distemper should not be given oil of chenopodium. The bacterial infection overburdens the kidneys and heart, frequently occasions gastro-enteritis, and leads in many cases to cachexia. Such animals do not tolerate anthelmintic treatment.

For the removal of whipworms from the dog, santonin is the best drug of which I am aware. It should be given, as noted by Hall (1917), in doses of a grain a day with an equal amount of calomel. I think it is safest to give it for a week, then suspend

treatment for a week, then repeat as often as necessary. Some experiments along this line are given here:

Dog No. 110, a mongrel, weighing 13.6 kilos, was given a grain of santonin and an equal amount of calomel daily for a total of 6 grains in 8 days. The dog passed no worms and was found to have 2 whipworms on postmortem examination. The treatment was a failure, evidently due to not being persisted in.

Dog No. 111, a terrier, weighing 10 kilos, was given the same treatment for a total of 6 grains of santonin and of calomel in 8 days. The dog passed 29 ascarids the second day of the treatment, 2 the third, 1 the fourth, and 1 the seventh. On postmortem it had 1 ascarid and 1 whipworm. It will be noted that 1 ascarid did not come away until the seventh day and that another was still present postmortem. Had the treatment been persisted in, it would have removed the other ascarid, probably in a day or two, and the whipworms in time.

Dog No. 108, a mongrel, weighing 9.5 kilos, was given santonin and calomel 1 grain each daily for a total of 12 grains of each in 15 days. The third day of treatment the dog passed the posterior portion of a whipworm and the fourth day the anterior portion. On postmortem the animal was free from worms.

Dog No. 71, a spaniel mongrel, weighing 12 kilos, was given 1 grain each of santonin and calomel for a total of 61 grains in 90 days. The ninth day of treatment the dog passed 1 whipworm. Postmortem the dog had 32 hookworms and 4 *Dipylidium;* this confirms the dictum that santonin is of no value against hookworms and also indicates its lack of tæniacidal value, so far as *Dipylidium* is concerned. The dog lost a lot of hair, as already noted above, and had sores around its nose, but it was very active at all times.

Dog No. 120, a mongrel, weighing 13.5 kilos, was given 5 grains each of santonin and calomel daily for 5 days, and then the dose lessened, on account of the persistent vomiting, to 2½, 3 and 3½ grains daily for a total of 50½ grains in 18 days. On the fourth day of treatment the dog passed 14 whipworms. Postmortem the dog was free from worms. This experiment and the preceding show the tolerance of the dog for santonin, when given with calomel, and also the need for persistent treatment in order to remove whipworms.

The most serious of the intestinal parasites of dogs is the hookworm. Hall and Foster (1918) found that chloroform at the rate of 0.2 mil per kilo, mixed with an ounce or so of castor

oil, had an efficacy of 57 per cent against hookworm; oil of chenopodium at the rate of 0.1 to 0.3 mil per kilo, followed immediately by an ounce or so of castor oil, or given with castor oil, had an efficacy of 32 per cent, and thymol and calomel, in doses of 0.298 to 1.752 gm., had an efficacy of 15 per cent. In further tests of chloroform in our laboratory at Detroit, I have been unable to obtain as high efficacy as was obtained in the work at Washington. However, I have found that healthy dogs have a considerable tolerance for chloroform, surviving doses, not only of 0.2, 0.3 and 0.4 mil per kilo, but also of 0.666 mil, 1.0 mil and 2.0 mils per kilo. I have been told by a physician that he has given chloroform in doses of a half ounce to an ounce to patients. Alessandrini only uses 3-4 grams for man. The oral administration of chloroform produces an acute yellow necrosis of the liver, and this same condition is present and responsible for death in delayed chloroform poisoning from anesthesia. The condition has been studied and described by Whipple and Sperry (1909). If the patient survives, the necrosis clears up in from 10 days to 3 weeks, leaving a practically normal liver. One of the Detroit dogs, No. 88, a collie mongrel, weighing15 kilos, was given by stomach tube 30 mils of chloroform, a dose rate of 2 mils per kilo, in 40 mils of castor oil. Soon after dosing, the dog lay down, but was up and around in an hour and showed no symptoms. An hour and a half after dosing, the dog vomited, and then lay down for a half hour. After that the dog looked and acted entirely normal. Twenty-one days after this treatment the dog had a litter of 7 pups, and at least one of these pups was alive and well 4 months later. Fifty-five days after the chloroform was administered this dog was put in a chloroform box with 4 other dogs. The other dogs died inside of an hour. This dog survived the same atmosphere for almost 7 hours and then appeared to be coming out of the anesthesia; more chloroform was added and the dog presently succumbed.

Attempts to remove hookworms with single doses of oil of chenopodium did not meet with a high degree of success. The repeated administration of small doses, 2-5 minims daily for several days, gave good results, but apparently occasioned some little gastro-intestinal irritation. The method most used at present in the removal of hookworms from man, the administration of 3 doses at hour intervals, gave the best results. Some tests of this mode of treatment were as follows:

Dog No. 289, a hound, weighing 21 kilos, was given 3 doses, each dose consisting of a 10-minim soluble elastic capsule of oil of chenopodium, followed immediately by 15 mils of castor oil, at hour intervals, the last dose being followed an hour and a half later by 4 mils of chloroform in 15 mils of castor oil. The following day the dog passed 61 hookworms and 5 ascarids. The animal was killed the fourth day and found to have 10 hookworms. The treatment was therefore 86 per cent effective against hookworms and 100 per cent effective against ascarids.

Dog No. 301, a spaniel mongrel, weighing 15 kilos, was given the same treatment, except that no castor oil was given with each dose of chenopodium and the chloroform was given an hour after the last one in 30 mils of castor oil. The day after treatment the dog passed 33 hookworms and 1 ascarid. The third day after treatment the dog was found dead. One hookworm was found postmortem. The treatment was therefore 97 per cent effective against hookworms and 100 per cent effective against ascarids. This dog was in a late stage of distemper and anthelmintic treatment was contraindicated. Nursing would probably have saved the animal; the anthelmintic hastened death.

Dog No. 300, a wolfhound mongrel, weighing 18 kilos, was given 3 doses, each dose consisting of a 5-minim soluble elastic capsule of oil of chenopodium, at hour intervals, followed an hour later by 4 mils of chloroform in 30 mils of castor oil. The next day the dog passed 3 hookworms. The animal was killed the fourth day after treatment and found to have 3 hookworms, 1 *Physaloptera,* and 15 *Dipylidium.* The treatment was therefore 50 per cent effective against hookworms and 0 per cent effective against *Physaloptera* and *Dipylidium.*

Dog No. 292, a hound, weighing 14.5 kilos, was given the same treatment as Dog No. 300, except that each 5-minim capsule was accompanied by 15 mils of castor oil. The following day the dog passed 23 hookworms and the second day 7 hookworms. The animal was killed the fourth day and found to have 1 hookworm and 2 *Taenia pisiformis.* The treatment was therefore 97 per cent effective against hookworms and 0 per cent effective against *Taenia.*

Dog No. 293, a collie mongrel, weighing 12 kilos, was given 3 doses, each dose consisting of a 10-minim soluble elastic capsule of oil of chenopodium, at hour intervals, the last dose followed an hour later by 15 gm. Epsom salts in simple syrup. The next day the dog passed 2 hookworms and the second day 2 more

hookworms. The animal was killed on the fourth day and found free from parasites. The treatment was therefore 100 per cent effective against hookworms.

Dog No. 294, a collie, weighing 19 kilos, was given the same amount of chenopodium in the same way, but the Epsom salts were omitted and one-third of a grain of cascarin was given with the first and third doses of chenopodium. Two days later the dog passed 2 hookworms and 1 whipworm and 4 days later passed 1 more hookworm. The animal was killed the fourth day and found to have 1 hookworm, 21 whipworms, and 6 *Taenia pisiformis*. The treatment was therefore 75 per cent effective against hookworms, 5 per cent effective against whipworms and 0 per cent effective against *Taenia*.

Dog No. 299, a mastiff mongrel, weighing 15 kilos, was given 3 doses of 19 minims of oil of chenopodium in soluble elastic capsules at hour intervals, each dose being followed by the feeding of uncooked meat, to ascertain the effect of the presence of food on the efficacy of the anthelmintic. The day following treatment the dog passed 3 hookworms and 5 ascarids. The dog was killed the fourth day and found to have 5 hookworms. The treatment was therefore 37.5 per cent effective against hookworms and 100 per cent effective against ascarids. The presence of food lessened the efficacy of the anthelmintic, as would be expected.

Dog No. 309, a foxhound, weighing 14 kilos, was given 3 doses of 10 minims of oil of chenopodium in soluble elastic capsules at half-hour intervals, followed a half hour after the last dose by 30 mils of castor oil. After this treatment the dog broke out of its cage and got some meat. It passed no worms and was killed the fifth day after treatment. Postmortem there were 2 hookworms and 6 whipworms. The treatment was therefore 0 per cent effective against hookworms and whipworms.

Summarizing the foregoing, it appears that very high efficacy against hookworms in the dog may be expected from the use of oil of chenopodium in 3 doses of 10 minims each for average-sized animals or larger ones and of 5 minims each for smaller animals. Even the latter dose is too large for toys, and should be cut down according to the size and condition of the animal. The chenopodium seems to be quite effective whether given alone or with 15 mils of castor oil to each dose. I prefer to give the castor oil, as I believe it adds to the safety of the animal very materially. The hour interval seems to give more efficiency than

the half-hour interval. Some purgative should be given not later than an hour after the last dose of chenopodium. I prefer the soluble elastic capsule to other forms of administration of the chenopodium for dogs. It is convenient and effective, so far as dozens of tests on dogs show. The addition of chloroform to a final dose of castor oil probably aids in removing additional worms.

Treatment for hookworm in dogs calls for considerable judgment. Such animals already have an irritated intestine due to hookworm petechiæ, and, if clinical cases of uncinariasis or kennel anemia, are weak, emaciated and anemic. It is easy to kill such dogs by anthelmintic treatment. Hookworms are difficult to remove and call for larger doses of drugs than do ascarids. They will not respond to such drugs as santonin, which are non-irritant, and they require the use of such drugs as chenopodium, chloroform or thymol, all of which act more or less as gastro-intestinal irritants. Under these conditions, it may often be advisable to combine nursing treatment with repeated treatments by small doses of anthelmintic at intervals of 2 weeks or so, until the removal of part of the worms and the nursing put the animal in shape to endure the relatively drastic treatment necessary to clean out the infestation.

The worms which are of commonest occurrence in cats are the ascarids. These set up substantially the same chain of symptoms in cats as in dogs, except that the high-strung nervous system of the cat prediposes it to certain nervous disorders, and cats infested with worms are frequently subject to "fits." The treatment I have used and found successful for removing these worms is to give the cat a half-ounce of castor oil and then stick a pin in a 5-minim soluble elastic capsule of oil of chenopodium and squire from 2 to 4 minims of the oil against the roof of the mouth, or against the tongue. This is safe and effective. One must use these small doses in treating cats in order to be on the safe side, as they are twice as susceptible to poisoning from chenopodium as are dogs, the minimum lethal dose per kilo being only half as large.

The common nematodes of poultry are the heterakids, including the large *Ascaridia* of the small intestine and the small *Heterakis* of the cecum. I have nothing to add here to the findings reported by Hall and Foster (1918), who found an efficacy against *Ascaridia* of 76 per cent for turpentine in 2-mil doses, mixed with an equal amount of olive oil and followed immedi-

ately by 8 mils of castor oil, and an efficacy of 69 per cent for oil of chenopodium in a dose of 0.2 mil mixed with 2 mils of castor oil and preceded by 2 mils of castor oil, and an efficacy against *Heterakis* of 19 per cent for chopped tobacco stems soaked in water and mixed with feed.

A consideration of the foregoing shows that in the present state of our knowledge our best anthelmintics for certain purposes are oil of chenopodium, which is perhaps the most valuable anthelmintic known, santonin, valuable where repeated doses are desired and gastro-intestinal irritation must be avoided, turpentine, which acts in some respects like a weaker oil of chenopodium, copper sulphate, valuable in the ruminants, where its emetic action is not manifested, and tobacco, which seems to be adapted to the peculiar task of removing heterakids from the ceca of poultry.

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PRACTICAL METHODS OF PROPHYLAXIS AGAINST WORM INFESTATIONS.*

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The development of methods of prophylaxis is a highly important branch of parasitology, and is one of the great practical objects toward which the investigations carried on by parasitologists are directed. In the formulation of practical methods it is essential to know not only that certain results will be obtained, but also why they are obtained. Accordingly, practical methods of prophylaxis against worm infestations can only be considered to have a solid foundation when they are based upon a knowledge of the parasites involved, and on this account knowledge of the life histories and behavior of parasites is of great practical importance. Methods of control must be adjusted to peculiarities in the biology of the parasites concerned. Furthermore, not only may it be necessary to vary our methods for different species of parasites, but it is often necessary to use various methods for the same species according to locality, host animal affected, season of the year, and other conditions. A comprehensive discussion of methods of prophylaxis against parasitic worms infesting live stock would necessarily extend to a great length, as about 100 species each of tapeworms and flukes, and at least 250 species of roundworms parasitic in domestic animals are known to science. Obviously, within the proper limits of the present paper, it would be out of the question to take into consideration all of these parasites, and even though the great majority can be passed over, either because we have too little knowledge of their life histories or because their economic importance is relatively slight, the number remaining is still too great to be adequately treated in a short paper.

Consequently, rather than to attempt a discussion of any considerable number of the parasitic worms affecting live stock, it has seemed desirable to direct attention more particularly to a few of the forms that I have had under investigation at various times. These forms are used as examples of the practical importance of knowledge of life histories not because they provide better illustrations than others but because I have had a more direct interest in them.

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The manner in which I have treated the subject assigned to me may inspire the criticism not only that I have fallen short of what might have been reasonably expected from the title but that within the scope to which I have limited my paper it contains very little that is really practical. The material presented, however, I believe has a distinct practical value in its bearing on the question of prophylaxis against parasitic worms and therefore I trust its presentation under the title borne by this paper may be accepted as not altogether inappropriate.

Certain granulomatous growths and so-called summer sores on the skin of horses are infested with nematodes. These nematodes are larval forms whose identity until recently was entirely unknown. Thanks to the work of Descazeaux in South America, Railliet in Europe, Van Saceghem in Africa, and Bull in Australia, it is now evident that these worms are the larvæ of one or more species of *Habronema*. Two species of *Habronema* are known which live as adults in the stomach of the horse. Prior to the work of the investigators just mentioned I proved in the case of one of these species *(Habronema muscae)* that the common house fly acts as the intermediate host. The maggots of the fly developing in manure from horses harboring the adult worms become infected with the parasite, probably as a result of swallowing the eggs or embryos which are contained in the feces of infested horses. It is also possible but perhaps less likely that the embryonic worms after hatching actively penetrate into the bodies of the fly maggots. In the fly maggots they undergo considerable growth and development. At about the time the mature fly emerges from the pupa or resting stage that follows the active maggot stage the worms have completed their development so far as they are capable of doing in the fly. Horses while eating frequently swallow flies and the mouths of horses commonly are very attractive to flies. It is therefore natural to suppose that the young parasites in the flies reach the stomach of the horse as a result of the horse's swallowing infested flies. I have in fact found in a horse's stomach all stages in the growth of the parasite from the latest stage found in the fly up to the full-grown adult worm, and there is little doubt that many *Habronema* larvæ reach the stomach of their host as a result of the swallowing of infested flies or fly pupæ. Fly pupæ are often very numerous amid the chaff in the bottom of hay mangers and are not infrequently swallowed by horses. In the published report of my investigations on *Habronema,* with reference to the fact that the

fly's proboscis is a favorite location of the larval worms, it was suggested that they may abandon their intermediate host in some such manner as *Filaria* larvæ abandon the mosquito, and it was stated that, although no evidence of such an occurrence had been obtained, it is conceivable that the larvæ might escape from the fly through a slight rupture of the proboscis occurring at a moment when the fly was sucking moisture from the mucous membrane of a horse's lips, after which they could readily reach their final location, the stomach. It would seem in the light of the researches of Bull, Van Saceghem, Descazeaux and Railliet that the presence of *Habronema* larvæ in summer sores is to be similarly explained; that is, they are probably introduced by flies while sucking moisture from wounds or perhaps even from the uninjured skin. It remains to be determined whether the worms in summer sores ultimately die in the skin or other tissues into which they may migrate, without undergoing further development, or whether they finally reach the stomach in a roundabout manner like certain parasites of the alimentary tract and other internal organs that are known to enter the body not only through the mouth but also through the skin. The case of *Habronema* is a rather good illustration of the practical importance of knowledge concerning the life history of parasites. Though our knowledge in this case is still incomplete, it is clearly valuable as a basis upon which to work in devising measures of prophylaxis. Without this knowledge there would be very little chance of hitting upon a successful scheme of avoiding *Habronema* infection, but with the practical certainty that certain worms are responsible for summer sores, and that these worms are transmitted to horses by flies which in turn acquire the parasites as a result of breeding in manure from horses harboring the adult worms in their stomachs, it is quite possible that at least one solution of the summer sore problem may be reached by a solution of the problem of eradicating the flies that breed in horse manure.

A few years ago it was discovered that sheep in this country were commonly infested with tapeworm cysts in the muscles corresponding in all respects to those which the Germans had found occasionally in sheep and which they had taken for the larvæ of *Taenia solium*. An idea of the frequency of these parasites may be gained from the fact that nearly 40,000 sheep carcasses have been retained by United States meat inspectors in a single year on account of infestation with muscle cysticerci. In

other words, one sheep out of about every 300 slaughtered showed infestation with these parasites in sufficient degree to be caught by the inspector. As cysticerci located in the muscles are often hard to detect, it is, of course, certain that many cases escape even the careful inspection given by our Federal inspectors, so that the actual frequency of the parasites is undoubtedly greater than that indicated. Most of the cases found are slight cases and would be passed for sterilization under the regulations applying to tapeworm cysts in hogs, but nevertheless no small loss in our meat supply would occur if it were necessary to subject all the sheep carcasses found affected with tapeworm cysts to sterilization. Investigation of the sheep cysts was made and by careful study and experiments it was conclusively demonstrated that instead of being the larvæ of a rather dangerous tapeworm of man, as formerly supposed, they were not forms transmissible to human beings but belonged to a previous unrecognized species of tapeworm of the dog *(Taenia ovis)*. With this knowledge it was possible to handle sheep carcasses affected with tapeworm cysts under a different rule of meat inspection, namely, the rule applying to cases of infestation with parasites not transmissible to man. This rule provides that carcasses need to be condemned or passed for sterilization only in cases of heavy infestation or in cases in which the parasites can not be removed by trimming. Carcasses found to be lightly infested are eligible for food purposes after the removal of the parasites. This discussion of a matter of meat inspection strays somewhat from my subject, but the rectification of an important meat inspection regulation was not the only result of the investigation of the sheep cyst question as it demonstrated how the spread of the parasite might be prevented. It is this result that is of special interest in the present connection. A scheme of prophylaxis based upon the assumption that sheep acquired their infection from swallowing the eggs of a tapeworm of man would necessarily fail. The truth of the matter having been established, however, upon a basis of conclusive experiments, it is evident that the proper prophylactic measures against the mutton cysticercus are to destroy unnecessary dogs, to burn or bury the carcasses of sheep or otherwise dispose of them so that they can not be eaten by dogs, to feed no uncooked mutton to dogs, and further to insure the freedom of dogs from tapeworms by periodical anthelmintic treatment. In short, practically the same measures apply as in the case of the gid parasite

and the echinococcus parasite, whose adult stages are likewise tapeworms of the dog.

Very often the problem of controlling parasites whose life histories are complicated by the necessity for intermediate hosts such as the two parasites just discussed is simpler than the problem of controlling a parasite with a direct life history. For example, it is a very difficult matter to prevent the spread of the common intestinal round worm of hogs, *Ascaris suum* or *Ascaris lumbricoides*. This parasite has a direct life history inasmuch as it is transferred from one hog to another through the medium of microscopic eggs passed in the feces of one hog and swallowed by another. Recently Major Stewart of the Indian Medical Service has made the remarkable discovery that if the eggs of *Ascaris* are fed to rats and mice they hatch out in the intestine and the embryos migrate to the liver and other organs, including the lungs, meanwhile undergoing considerable growth and development. From the lungs the larvæ migrate up the trachea, and may be recovered from the saliva. Having crawled up the trachea, they pass down the esophagus, through the stomach and into the intestine. They remain for a time in the cecum, but finally leave the body in the feces. About two weeks are required for these migrations. Stewart failed to infect pigs by feeding them *Ascaris* eggs, and was led to conclude that rats and mice act as intermediate hosts. According to his view, the transfer of the larvæ to hogs or human beings is brought about through the contamination of food or water by the saliva or feces of infested rats or mice during the time the parasites are present in the mouth or intestine of these animals. Mr. Foster and I have repeated Stewart's experiments with results very similar to his, but have determined some additional facts, and have demonstrated that the parasite has a direct life history, so that our conclusions are at variance with those expressed by Stewart. Omitting a discussion of the details of our experiments, I may say that we have conclusively proved that pigs become infected with *Ascaris* as a result of swallowing the eggs of the parasite. After hatching, the larvæ undergo the same migrations as they do in rats and mice, with the difference that when they reach the pig's intestine after passing through the lungs they settle down and slowly develop into adult worms. In rabbits and guinea pigs, on the other hand, we have found that the larvæ, as in rats and mice, are unable to continue their development in the intestine. The incomplete development of *Ascaris* larvæ in various animals

shows that they are able to adapt themselves to a transient existence in strange hosts, but affords no evidence that these animals act under any circumstances as intermediate hosts. Stewart observed that rats or mice are very liable to die from pneumonia in cases of heavy invasions of the lungs by migrating *Ascaris* larvæ, and this fact was also noted in our experiments on rats, mice, guinea pigs, and rabbits. We have further found that pneumonia is liable to occur in pigs at the time the larvæ invade the lungs, and this pneumonia in pigs as well as in the smaller laboratory animals may result fatally. It seems not improbable that future investigations will show that infection with *Ascaris* and closely related parasites is responsible for some of the obscure lung troubles in pigs, children and other young animals.

Ascaris is harbored by a high percentage of hogs in all parts of the world. Though it appears to be most common in pigs less than a year old, it is of rather frequent occurrence in older animals. The eggs are present in the feces of infested animals in large numbers and in course of time the soil of places occupied by hogs becomes heavily laden with them. In the case of many species of parasites the eggs or the larvæ that hatch from them do not survive more than a few months. *Ascaris* eggs, however, are endowed with remarkable vitality and have been kept alive for as long as five years. They can survive for some time in a dry condition, and their shells are very impermeable, so that they are not affected by ordinary disinfectants. As an indication of the impermeability of the shells, it may be noted that formaldehyde solution makes an excellent medium in which to incubate the eggs in studying the embryonic development of the parasite. Taking into consideration such facts as these and considering also that the hog lives in particularly close relation with the soil, it is clear that the problem of preventing infection with *Ascaris* is not an easy one.

Notwithstanding the evident difficulty of the problem, however, there is one line of attack against the parasite which appears promising, and may lead to good results in reducing the damage done by it. Evidence is available which indicates that as hogs grow older they are not only less liable to injury by *Ascaris* but are also less susceptible to infection. It may be assumed therefore that the protection of very young pigs is particularly important. Evidently a fertile source of infection in the case of the suckling pig is the teats of the sow, soiled as they commonly are with the dirt of the pig pen. Such dirt is liable to contain many

Ascaris eggs, so that when the pig suckles it swallows not only its mother's milk but also very often *Ascaris* eggs in large or small numbers. Accordingly, it would seem that special care of the sow just before and during the suckling period with respect to cleanliness of herself and of the places in which she is kept is worthy of serious consideration as a prophylactic measure against *Ascaris* infection.

Another difficult parasite to manage is the stomach worm of sheep and other ruminants, the species of nematode known as *Haemonchus contortus*. Investigations which I made a number of years ago demonstrated the correctness of the belief previously held on theoretical grounds that this parasite has a direct life history, no intermediate host being necessary. The eggs of the stomach worm pass out of the bodies of infested animals in the feces. The larvæ which soon hatch from the eggs undergo certain developmental changes and in a few days in warm weather are ready to be swallowed by a sheep or other ruminant. After reaching the stomach of their host they complete their development to maturity in about three weeks. An interesting point that came out in these investigations was the fact that the larvæ when they reach the infectious stage crawl up blades of grass, thus getting into a position where they are more likely to be picked up by grazing animals than if they remained on or in the ground. Another important fact is the slight resistance of the eggs and newly hatched larvæ to freezing or drying. On the other hand, the larvæ that have reached the infectious stage are highly resistant to cold anl also to dryness, and consequently can live over the winter and also survive periods of drouth. Although the larvæ in the infectious stage are able to live many months, they ultimately die if they do not reach a suitable host. From knowledge thus far available it seems safe to assume that practically all infection in a pasture will die out within a year after the removal of sheep and other ruminants. Apparently also there is little residual infection in fields that have been plowed up and replanted. Just how long the adult parasites may live in an infested animal is uncertain, but they appear to be rather short lived, inasmuch as the number rapidly diminishes in animals that are removed from pasture, and placed in stables or dry yards. In such places the chances of reinfection are comparatively slight. Sheep, however, that were kept on frequently cleaned board floors still showed a few stomach worms at the end of about a year and a half, but it is believed that these resulted from re-

infection rather than they had survived in the sheep since their removal from pasture. After considerable experiment the conclusion has been reached that the only certain way of preventing infection among lambs is to take them away from the ewes at birth, feed them artificially on sterile milk, and keep them in clean pens and pastures, using scrupulous precautions to avoid the introduction of infection with contaminated feed, or water, or dirt carried on the feet of attendants. Obviously, such a rigorous method can not be applied practically. The plan of taking the lambs away from the ewes at birth, of course, would not be necessary if one could be sure that no worms were present among the ewes, but stomach worms are so common that there is no assurance that at least a few will not be present. Furthermore, medicinal treatment can not be depended upon to remove all stomach worms nor has it yet been found possible under practical conditions to protect the ewes from reinfection long enough for all the worms in their stomachs to die or disappear. In view of the practical impossibility therefore of entirely and with certainty ridding sheep of stomach worms, or of raising lambs altogether free from them, sheep must be considered always to be infected even though in slight degree, and the practical problem to be solved is to keep the number of worms down to a point where they will do no damage.

In work at the Bureau of Animal Industry farm near Vienna, Virginia, where study is being made of methods of handling sheep to avoid stomach worm trouble, successful results are being obtained by Doctor Cooper Curtice, who is in immediate charge of the work, in the following manner. During the autumn and winter the breeding ewes, the lambs of the spring crop and the yearlings are kept in separate flocks. The ewes are allowed to graze without reference to whether infection is present in the fields or pastures used. The lambs are kept, however, only in fields which have been plowed and planted with appropriate forage crops since their previous occupancy by sheep, and are changed to fresh fields as the grazing becomes exhausted. They may remain in one field for several weeks or months. This practice is continued throughout the following year, and they are similarly handled the autumn of the next year as yearlings, after which they are handled as breeding ewes. Beginning about May 15, the lambs and yearlings of the year before (now yearlings and two-year-olds respectively) are dosed once a month until September 15 with 50 to 100 c.c. of one per cent copper

sulphate solution, meanwhile being changed from time to time to fresh grazing as the forage crops develop. The lambs from the breeding flock are dropped in April. Until about June, when the first forage crops become available, the lambs are kept in the stable. The ewes are turned out daily on stubble fields or similar pasturage, being brought to the stable at noontime to allow the lambs to suckle, and are also kept with the latter in the stable at night. The manure is removed from the stable about once a week. About May 15 the ewes receive a dose of 100 c.c. of one per cent copper sulphate solution, and thereafter until September 15 are similarly dosed once a month. When the pasturage prepared for the lambs becomes available in June they are turned out daily and grazed between hurdles or portable fences, a fence in front and a fence behind, being moved to a fresh area every two to three weeks. At noontime they join the ewes in the stable, go back to pasture in the afternoon, and are kept with the ewes in the stable at night, so that they are with the latter during a period at noon and during the night, at other times being kept separate. Late in July or early in August the lambs are weaned and afterwards stabled and pastured entirely apart from the ewes. The two or three weeks' shifting of pasturage is continued until about the middle of August, when the lambs are turned into the corn field, and a month or so later they are placed on a field or fields which have been plowed and planted to a suitable forage crop at the proper time to be ready for them. After this the lambs are handled as yearlings. Under this method it will be noted the lambs receive no medicinal treatment, the treatment of the ewes, and the rotation of the pasturage being depended upon to prevent stomach worm trouble among the lambs. This method has also served to protect against trouble with other internal parasites as well as stomach worms. Complete freedom from stomach worms and other parasites has not been secured but the degree of infection has been exceedingly slight. The scheme outlined above may seem troublesome but it has not proved particularly difficult to follow. Further investigation may enable us to correct defects in this method, as well as to simplify it and make it more practicable, and we are encouraged in believing that we will finally be able to outline a definite scheme or schemes for handling sheep that can be depended upon to prevent losses from stomach worms and that at the same time will not be expensive or unduly troublesome.

Having in the foregoing briefly discussed a few special cases illustrating the usefulness of knowledge of the life history and behavior of parasitic worms in the development of practical methods of prophylaxis, I shall conclude by mentioning some rules or principles which have a more or less general application in the prevention of infestation with parasitic worms.

Wet land is usually very favorable to parasitic infestation. It should be drained or excluded from use as pasture.

Close-grazing, over-stocking, and long-continued use of the same pasture favor excessive parasitic infestation. Stock should be changed to fresh pasture as frequently as possible. The use of planted forage crops and the changing of stock from one field to another in regular rotation will help greatly to keep down infestation with parasitic worms to a minimum.

In general, the parasites of ruminants, horses and hogs are not inter-transmissible and these three classes of animals may be pastured in rotation on the same ground without danger (with some exceptions) of the passage of parasites from the animals of one class to those of another.

Live stock should be excluded from places where stable and barnyard manure is stored, and care should be taken that such places do not drain into pastures or paddocks or into water supplies. Exact data are lacking concerning the importance of manure as a source of parasitic infection when spread on fields after removal from piles or pits in which it has undergone more or less fermentation. The use of such manure on fields may not involve as much risk of spreading infection with parasitic worms as might be supposed, especially if the manure is plowed under after its application.

Animals suffering from infestation with parasitic worms will often show great improvement if they are removed from pasture and placed in yards free from vegetation, or in stables, provided these places are kept in a dry and cleanly condition by proper drainage and frequent removal of manure.

Well-fed animals are less likely to suffer from the effects of parasitic worms than those provided with insufficient food.

A clean water supply protected from fecal contamination is an important item among the general precautions to be taken against the infestation of live stock with parasitic worms.

Human excreta should be disposed of in such a way that there may be no contamination of feed, or water, or of places occupied by live stock.

All unnecessary dogs should be destroyed. Others should be kept free from tapeworms. Dead animals should be disposed of in such a manner as to prevent their being eaten by dogs. Dogs should not be fed raw mutton or uncooked offal of any kind.

[The discussion by Dr. Seymour Hadwen, of Ottawa, Canada, on Practical Methods of Treatment and Prophylaxis for Arthropod Infestations was not furnished the Journal for publication.]

THE CHAIRMAN: The symposium on parasitology is now open for general discussion. I know some of your have some questions to ask.

DISCUSSION.

DR. DALRYMPLE: A good many years ago, at the Louisiana Station, we made some experiments with parasites in sheep. The object at the time was to see if we could raise lambs from mothers infested with the *Œsophagostomum columbianum*. I think Dr. Ransom remembers those experiments because they were published in bulletin form at the time. In trying to get the lambs free from infestation from the mothers we erected a place with three compartments. One was at the end for the ewes, another at the other end for the lambs, and the middle one was the suckling pen. The object of that was to try to keep the lambs away from the mothers except at certain periods, which we called suckling periods, during the course of the day. Afterwards, I was convinced that the nodule worm really was not doing the harm that was supposed of it, but that the stomach worm was doing a heap more harm than the worm we were investigating at the time, because all the lambs afterwards had stomach worms. Then we started an investigation with the stomach worm, and this previous work, keeping the animals apart, suggested an arrangement there. First of all, we tried what we called the "dry-lot method," feeling that if we got the lots clear of grass and kept them that way there was a possibility of reducing the chances of infestation. That method led up to a suggestion of arranging an area, depending on the size of the flock of sheep, with one part for infested ewes and another part for the lambs, having between the two lots a ditch sufficient to carry off any infection that might be carried from the lot the ewes occupied onto the lot containing the lambs. We had a dog-proof fence around the whole thing to keep dogs away, and arranged this three-compartment shed so that we could keep the lambs abso-

lutely free from their mothers except during the suckling periods. Then the presumption was, we could raise sound lambs, or practically so, from diseased or infested mothers, and when they were ready to wean and place upon clean grazing provided for them, we could reduce the mortality, raise the lambs up to a marketable condition with as little infestation as possible. We at that time tried a great many agents. We experimented with gasoline, coal-tar creosote, and even with carbon bisulphide. I remember we tried giving it in milk, in oil, and as an emulsion. At that time we did not try sulphate of copper, but we had varied results from the other agents mentioned. Speaking about sulphate of copper, we have been recommending that agent a good deal, of late years, both for lambs and calves, using it in the strength that the South African people recommend, something like 16 ounces to 9½ gallons of water, in solution, giving so much of the solution according to the age of the animal. I have been recommending this in cases where the animals were pretty badly infested, to give two doses during one week, then skip a week, and give two doses the third week. During this time we had the lambs or calves kept in a dry place away from infection, and then, of course, put them onto a clean place after the treatment with sulphate of copper. This was not done under my own supervision, but merely by suggestion, and I believe with good results. I do not know whether that is the best method of giving this treatment, but it seemed to evidence good results when given in the manner described. Of course, as in many other sections of the country, we have large grazing areas, and it is difficult to treat individual animals on our immense cut-over pine lands in the South. They are magnificent grazing lands for both sheep and cattle, but we have to use treatment in a more wholesale way, rather than by a very intensive individual method.

I want a little information on the Armed Sclerostome, or what we used to call the *Strongylus armatus*. We hear from our practitioners in Louisiana a great deal about this parasite. The treatment, I think, which they have given has been that recommended in some works on parasitology, at some stages giving turpentine, and at others antimony tartrate. I believe, possibly on account of carelessness in connection with the water supply in that level section, there may be a good deal of infection of the shallow wells through seepage from infected feces, and which may be a continuing source of the trouble. However, it has increased to such

an alarming extent that I once thought of writing to you (Dr. Ransom).

Speaking about horse flies or tabanids, I recollect as far back as 1896 we made an investigation of a very serious outbreak of anthrax in the northern portion of our state. I do not remember just the different varieties present, but I think we referred to the most predominant at that time as the *Tabanus lineola,* which were in plague numbers. Even house windows were darkened by these flies, and when they were frightened from the backs of animals it was just like taking a sprinkling pot full of blood and sprinkling the animals' backs, the blood pouring from the punctures. In reporting the outbreak I remember we stated our belief that, on account of the speed with which the infection traveled, there must be some variety of insect to carry it so fast and spread it so widely; and that horse flies were in such tremendous numbers, there was no doubt in our minds that they were the responsible carriers of the infection from one animal to another. That we have since proven in our laboratory work by Dr. Morris, our bacteriologist and assistant veterinarian of the Station, who has been doing some excellent investigation work with carriers of anthrax infection. He has transmitted the disease from infected animals to sound animals by means of some of the blood-sucking insects, such as the horn fly, etc. While in the early days we did not think so much of insects as transmitters of disease, I was very much impressed with this probability, and made the statement at that time that some day it would be found that insects were very much more responsible for the transmission of diseases than was then thought. You know what it is today. So many diseases are now known to be transmitted, either directly or indirectly, through the medium of insect life. Is there anything you have that is later than the old treatment for the *Strongylus armatus,* Dr. Ransom?

DR. RANSOM: I think Dr. Dalrymple's question is answered in part by Dr. Hall's paper. I have done practically no work at all on the treatment of these horse parasites. Dr. Hall's paper is as new to me as it is to Dr. Dalrymple.

DR. DALRYMPLE: I understand at a certain stage the worm is in the circulation and at another stage in the alimentary canal. It is a question of treatment during the different stages of the worm, I presume, if there is anything new.

DR. RANSOM: There are three species that have been commonly considered under the name of *Strongylus armatus.* There

is *Strongylus vulgaris,* which is a rather small species and which has its younger stages in the mesenteric arteries. It is that form which is believed by Looss and others to be the sole cause of verminous aneurism. Another form has its young stages in the pancreas, connective tissues between the liver and stomach, and in similar locations. The young stage of still another species is found in the subperitoneal connective tissue, particularly under the peritoneum on the right side of the body and also in the testicles of cryptorchids. Those three have each one some different habits with reference to the larval stages. The early history of these forms, so far as we know them, is very similar in each case, that is, the eggs pass out of the body in the feces and are spread about over the pastures and hatch very promptly. After a period of development, which probably requires only a few days, the larvæ reach what may be called the final larval stage, and in this stage, as in the case of the stomach worms of sheep, the larvæ climb up blades of grass and in that way get to points where they are more likely to be picked up by horses while grazing. It is on that account that more infection is acquired by horses on pasture than in stables.

DR. FITCH: In relation to Dr. Hall's paper and the use of oil of chenopodium in the treatment of strongylidosis of horses, it seems to me rather strange that he could recommend oil of chenopodium as strongly as he did without taking into consideration the lesions which may exist in the blood vessels, in the peritoneum and in the other internal organs caused by this parasite. I do not know the action of the oil of chenopodium upon the larvæ of these parasites which exist in those places, but I am rather of opinion that there it has very little, if any, action. Is there any data on this question?

DR. RANSOM: Nothing new.

DR. FITCH: It would seem to me then, even though you rid the intestinal tract of *Strongylus equinus, Strongylus edentatus* and *Strongylus vulgare,* nevertheless the larvæ of each are found in these other localities, you have opportunity for reinfection and possibly more pronounced lesions and more pronounced symptoms resulting from the lesions in the other localities. Certainly it would be a boon to certain sections of the United States, and particularly in Minnesota, if we could have some agent that would rid horses of those larvæ which enter the blood vessels. Aneurisms are common in certain districts in Minnesota. Again, in regard to the *Habronema* of which Dr. Ransom spoke, in all

the autopsies which I made at Cornell University on horses, I never found a specimen of *Habronema megastoma*. Dr. Crocker, who conducts the autopsies at the University of Pennsylvania, tells me that *Habronema megastoma* is a relatively common parasite. In the few autopsies which I have performed at the University of Minnesota we have found a number of *Habronema megastoma* and a few *Habronema microstoma*. *Habronema muscae* is transmitted by flies and there is a possibility of the others being transmitted in the same way. It seems strange that there should be this localization in the parasite, and I should like to ask Dr. Ransom if he has any explanation in regard to it. Further, I would like to ask if there is any explanation in regard to the relative inefficiency of the oil of chenopodium for the *Ascaris* of horses.

DR. RANSOM: With reference to Dr. Fitch's question concerning *Habronema*, no explanation occurs to me why it has failed to be present at Ithaca and is fairly common in St. Paul. Perhaps Dr. Fitch was not looking for it.

DR. FITCH: We were.

DR. RANSOM: Perhaps the time of year had something to do with it, and climatic conditions may be an important factor.

DR. FITCH: We performed autopsies as they came along and they occur at different times of the year.

DR. RANSOM: I have found *Habronema* in Colorado, Nebraska, Illinois and the District of Columbia.

DR. FITCH: Have you ever found it in New York?

DR. RANSOM: I have never had an opportunity of examining horses in New York.

DR. FITCH: Are there cases on record?

DR. RANSOM: No, not so far as I know.

DR. FITCH: They probably occur.

DR. RANSOM: Yes. With reference to the other question about oil of chenopodium and *Ascaris*, I am just as much in the dark as Dr. Hall is as to why it should be so effective in the case of pigs and ineffective in the case of horses. The thought occurs to me that possibly, since Dr. Hall has referred to only relatively a few cases in which it was tried on horses, his failure to remove the parasites may have been more or less accidental. As with other remedies, it is important to have not only carefully controlled experimental evidence, but in addition a large mass of evidence derived from the practical use of the remedy before drawing a definite conclusion. The use of medicinal agents is

affected by so many conditions that one is hardly safe on the basis of a few experiments to draw a conclusion as to the efficacy and value of a drug. Accordingly, it seems to me we should not draw very definite conclusions as to the value, or lack of value, of any particular remedy for a certain parasite in a certain animal until a considerable mass of data is accumulated. This is a point which Dr. Hall emphasizes in the introduction of his highly interesting and important paper.

DR. HOSKINS: I was present at the autopsy of the first horse that Dr. Hall tried chenopodium on and a much more surprised man than Dr. Hall was, at the result of the autopsy and the failure of chenopodium, would be hard to find. He is going to keep at it, however, and has stated in his paper that he is unable to figure out why that particular drug should be so efficacious in other species and fall down so flatly in horses. He is going to keep on until he strikes the right combination. He is strongly of the opinion that some modification of the method of administering it will prove effective, either in repeated, graduated doses or in combination with something else, and it is his intention to continue the experiments. Of course, it means a horse every time he conducts an experiment, and it is rather a costly procedure. He usually has to wait until we have a horse for which we have no further use, and the work is carried on in that way.

DR. FITCH: Did you notice whether the horse in the experiment had all the species of Strongyli or whether they were all *equinus,* and also whether there were any larvæ present?

DR. HOSKINS: I would not state positively on that point, although I believe he has found in many of his cases that there were representatives of all three species.

DR. CONNAWAY: Just a little matter of history connected with the relation of flies to anthrax that Dr. Dalrymple mentioned. I recall an outbreak of anthrax in Mississippi in the summer of 1889. Did you have the same trouble in Louisiana at that time?

DR. DALRYMPLE: That was the year I went there.

DR. CONNAWAY: It was the summer of 1889. It was not very long after the Pasteur treatment had been discovered. There was a popular notion among planters there that a certain fly—I do not know just what particular fly it was—was associated with this disease. They applied ointments of various kinds to keep those flies off, so we see sometimes our science follows popular notions which give us good suggestions. The same, I think,

is true of the tick. Old Col. Dean, of the Bureau of Animal Industry, who was one of the old inspectors that had to deal with the tick in the early days, told me that the suggestion that the tick was a carrier of Texas fever came from the observation that cattle from certain districts were more ticky than other cattle from the South, and that those very ticky cattle were worse spreaders of this disease when they came on to our Northern pastures, so there was another popular notion that the tick was a carrier of disease that was proved later by scientific investigation.

A METHOD OF OPERATING SCROTAL HERNIA IN BOAR PIGS TO SAVE THE TESTICLE.*

H. S. MURPHEY, Ames, Iowa.

HISTORY.

Last spring a number of telephone calls and letters were received from a community asking regarding a method of operating boar pigs, with the idea of saving the testicle and using the animal for breeding purposes. We were told that a certain veterinarian, one of our recent graduates, was doing such an operation successfully. We referred the inquiring veterinarian to this veterinarian for information, and believed that we had extricated ourselves from a dilemma in a diplomatic manner, but soon both veterinarians went to the army and the owner of the pigs then began writing us. After some discussion, the clinic staff decided to attempt the operation if the owner would assume the risk. Accordingly, a letter was sent to the owner pointing out the dangers of the operation and the probabilities of failure. It was pointed out that the operation might not succeed on account of failure to close the hernial ring, that the contraction of scar tissue following the operation might result in sterilizing the animal, and that there was also a possibility that the animal would throw ruptured pigs, but in spite of this the owner sent us three pigs. Five were operated in June and July, 1918. In all of the operations the hernia was cured. Three of the pigs have made a complete recovery and are heading herds. One of them has not been used for breeding purposes, but is vigorous. The fifth would pay no attention to a sow in heat. He was castrated January 24, 1919. Extensive peritoneal adhesions were present

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on the operated side, but both testicles contained very large numbers of actively mobile spermatozoa. It is now evident that he lacked only the sexual appetite.

METHOD OF PROCEDURE.

First, shrink the animal for one or two days. If the abdomen seems to be very full it is advisable to give a physic. Second, administer 4 to 6 grams of chloralhydrate per 50 pounds weight, per rectum, after lavage. After 20 to 30 minutes the case is ready for operation. The pig is placed on his back with the hind parts elevated at an angle of 35 to 45 degrees. Rigid aseptic precautions are essential. The following instruments are necessary: scalpel, 3 or 4 hemostats, hernia clamp, catgut and a Peter's ligature needle, Carson's special curve ligature needle, two suturing needles, and silk or linen suturing material. Reduce the hernia by manipulation. A liberal incision over the external ring is made through the skin, fat and fascia, exposing the tunica vaginalis communis, and also the muscular wall of the abdomen in front of the ring. The tunica vaginalis communis with its contained spermatic cord is separated from the underlying tissue so that the whole of it may be palpated and grasped just posterior to the external inguinal ring. The handling should be done carefully in order not to set up irritation resulting in adhesions not wanted. If the hernia has not been reduced it should be at this time. There are very seldom adhesions in scrotal hernia, so that reduction is a comparatively simple process.

Locate the spermatic cord in the posterior part of the tunic. The ductus deferens, and the vessels can be palpated through the tunic without difficulty. Pick up the common tunic with the right hand while the left hand holds the spermatic cord posteriorly; have an assistant place the clamp longitudinally on the tunica vaginalis communis so that the canal will be obliterated both longitudinally and tranversely. Before the clamp is tightened draw the tunic downward out of the canal as far as possible without injuring the peritoneum, clamp tight and suture tunica vaginalis communis close to the clamp with catgut, using the lock stitch. Remove clamp and allow cord to return into inguinal canal. It is now advisable to push the spermatic cord downward and medially so that the anterior portion of the external ring may be sutured. Two or three strong retention sutures are put in here merely to hold the parts rigid until the inflammatory reaction will cause enough adhesions to keep the canal closed.

Touch edges of skin with tincture of iodine and suture, using Glover's stitch No. 2, also known as the whip stitch. Suture should be left in from 7 to 10 days, the animal forced to take some exercise, given light fluid or semi-fluid diet. The swelling, which is severe, but mostly edematous, due to shutting off of the outgoing lymph vessels through the inguinal canal, should be massaged daily.

My colleagues in the clinic, Drs. C. H. Covault and T. S. Leith, share the credit with me for the technique and execution of this operation.

CHOREA IN DOG (ST. VITUS' DANCE).

OSCAR SCHRECK, New Haven, Conn.

Chorea in its generic signification includes such a wide range of nervous conditions, and has for its predisposing causes such a variety of pathological lesions that at times some confusion arises from the fact that under the name "Chorea" are included several forms of nervous diseases and wrong diagnosis and etiology is apt to be made. Chorea is a peculiar disorder, for the most part, of early life of the animal. It may, however, begin in adult life, and is essentially a functional disorder of the nervous centers. Characterized by disorderly movements, which in this instance are usually unilateral, but soon become general. The whole body of the animal is not usually affected until late in the disease, and the left side is usually more severely attacked than the right. But the animal is not deprived of consciousness, and with it has the power of all voluntary motion. It is not uncommon to meet with it at all seasons of the year. The impairment is the result of bacterial or chemical poisons upon the neurons, and probably a nervous predisposition plays a chief part. In general terms, Choreic movements of all kinds are primarily due to neuronic weakness or instability. Worms are believed by some to be a frequent exciting cause; also dentition, intestinal irritation, pregnancy, etc., and finally atmospheric conditions. Few cases in the animal that are the sequelæ of distemper ever wholly recover. The disease is also seen often in the spayed animal. Constipation, debility, etc., are also stated as causes.

SYMPTOMS.

Chorea generally comes on insidiously, and the onset is seldom well marked, and not infrequently before any convulsive move-

ments are recognized, with more or less general loss of health, and, as a rule, first the animal's disposition becomes irritable or moody, with impairment of the nutritive functions. Various prodromed symptoms of this disease are mentioned by the different authors, but the choreic movements are mostly first manifested upon one side, to one leg or shoulder, with a peculiar action and twitching of the eyelids, which the animal has no power to control, and any excitement is apt to intensify the muscular twitchings In the dog, usually the muscles of the head and neck are affected. The actions of the muscles of the head and neck are probably as incoherent as those of the face, due to alterations in the spinal cord, or to the disease of the facial nerve affecting the face only, so that the head is somewhat jerked to one side, and the muscles of the body partake at times of general convulsive movements, and deglutition at times rendered difficult. In the fully developed disease the symptoms vary in degree rather than kind, and there will also be found some impairment of the strength of the affected muscles of the animal, some paresis, a fact especially easy of recognition in cases of unilateral chorea. The animal's appetite is often affected and bowels confined. In some cases urine and feces are involuntarily discharged and the urea excreted is greatly increased. In the progress of the disease the eye loses its brightness and intelligence, and we often see a very marked irregularity in the breathing, awkwardness of movements in the extremities and difficult for the animal to stand still. The convulsions generally subside in some degree when the animal is lying down (if they are not very violent); they are, however, at times very severe just preceding repose. The animal may be able to restrain them for a few minutes, but they soon become aggravated again in a short time. This and the convulsive twitching movements of the face, ears, limbs, with erratic behavior of the voluntary muscles, when called into action, are characteristic of chorea.

The changes which exist in the brain or spinal cord in connection with this disease are unknown, and it is doubtful if any exist. All theories in relation to it are either pure assumptions or are based upon insufficient data. But we do know that the disease seems to exist in animals that have had isolated cases of hysteria or epilepsy among different branches of their family.

TREATMENT.

Chorea, or St. Vitus' Dance, is, as stated, a disease of the nervous system, which is most frequently seen in the young animal. It responds to treatment often, but it is by no means rare to meet cases which are persistent and will not yield to any remedial measures we can bring to bear, and in such, recovery is not certain. In the treatment we should, as far as possible, remove all sources of reflex irritation, or any existing cause, such as worms or anything which disturbs and annoys the animal; such does harm. If there is constipation it must be immediately removed. As Chorea in the dog and cat, in most cases, is allied closely with distemper, arsenic is the most favored remedy with some, when the Chorea is not dependent upon rheumatism. Arsenic will always maintain its place in the treatment of Chorea or of its many neuroses. There are times when the remedy fails and we are unable to tell under what circumstances the arsenic may be expected to be effective and when not, and, as it is not a local disease, but one in which motor disturbances are produced as a result of impairment of the nervous functions (reflex Chorea, however, should not be forgotten), the treatment may be divided into three parts. First, the removal of the cause; second, to stop the waste of nervous energy in the animal; and, third, to stimulate and build up the nutrition of the neuron bodies. This is a disease in which we might suppose the agents commonly called antispasmodics could be used with advantage, and experience has proven that, as auxiliaries, they may, and, in fact, are, frequently very valuable. As general remedies calculated to control spasms, however, they are very ineffective. It is impossible, therefore, that any one mode of treatment, or any particular set of remedies, can or do answer in all cases. Excellent results have been obtained by simple hygienic treatment, generous diet, and the animal kept as quiet as possible. As the cell bodies of the neurons must be supplied with nutrition, and as many animals will not take sufficient nourishment, to say nothing of an abundance of food which should be taken in this trouble, forced feeding should be resorted to if necessary, feeding often and in small quantities at a time. Raw eggs seem to work wonders in the treatment of this disease in the dog; in fact, all nervous troubles. (Two or three eggs are to be beaetn up with a tablespoonful of cold water and fed to the animal.) Fats play an important part in nervous nutrition and should form a great part of the food of the animal. As is well known in human

medicine, cod liver oil is highly spoken of, but in our patients fats of meats and milk are used. Raw eggs stirred in milk is a valuable food, because it contains a chemical compound which acts as a stimulant to cell metabolism. Scraped raw beef is easy of digestion, which is of the utmost importance in this disease. As excitement and bad hygienic rules are predisposing factors, supplying the animal with opposite conditions ought to, and, in fact, do, effect improvement. The remedies useful are the mineral tonic group, of which arsenic stands first; and still other agents are used by some. However, we cannot say that any drug or drugs does the greatest good; we can only give results of our own methods used in the treatment of this disease. Galvanization is also serviceable (not too strong); saline solution, when the bowels are confined; sodii salicylate, 2-7 grains, has been highly recommended; also antipyrin in 10-grain capsules, followed by the systematic employment of arsenic, if the disease does not respond to antipyrin. Exalgini, as recommended by Brumley, has given results in mild cases in my hands. But the best results will be derived from drugs given for the purpose of stimulating the cell bodies of the neurons to more active metabolism, so that they may take up the food supply brought to them. But the doses must be small, for there is danger of over-stimulation, which is detrimental to the animal. Nuclein and lecithin are also highly recommended by some, claiming the system should be furnished the constructive elements it lacks or in which it is deficient.

Below are given some useful prescriptions in the treatment of this disease which have been tried by the writer with more or less success:

℞ Tr. Gelsemii.....ʒ ij
Stronii Iodi.....
Stronii Bromi.....aa....ʒ j
Elixir Pep. Lactat.....qs....ℨ iij

Sig. Teaspoonful in a little water every two to six hours as required to control the symptoms.

℞ Monobromated Camphor.....gr. xlv
Ext. Quassiæ.....gr. xxx
Ext. Belladonnæ.....gr. iv
M. et. fiat pill No. XXX.
Sig. One pill t. i. d.

℞ Sol. Potassii Arsenitis.....℥ ss
Syupi Ferri Iodii.....℥ j
Sig. 10 to 30 drops in water t. i. d., reducing and increasing dose, watching the effect of the drug.

℞ Liq. Potasii Arsenitis.....℥ j
Tinct. Ferri Mur.....℥ ij
Inf. Gentianæ.....℥ xiij
Sig. Teaspoonful t. i. d.

IMMUNIZATION PRODUCTS AND INDICATIONS FOR THEIR USE.*

CHARLES MURRAY, Ames, Iowa.

Immunity represents resistance to infection. If such resistance be the attribute of a race or species it constitutes a natural immunity; if it be attained through the activity of the body cells as a result of having had the disease, or as the result of inoculation with a modified or attenuated form of the causative factor, it is known as active acquired immunity. If the resistance to disease is due to defensive factors not originating in the individual protected, but to factors introduced by the injection of serum from another individual which has acquired an active immunity to the disease in question, it constitutes a passive acquired immunity.

The purpose of immunization is to increase any resistance already possessed by an individual. The nature of the disease determines the extent of such increase, and the nature of the disease depends, in turn, upon the infectious agent and the host. The remarkable success attending the immunization against some of the diseases first combatted by this method (smallpox, for example) has led to the belief that the same results may be obtained in all diseases. Pasteur's vaccination of cattle and sheep against anthrax in 1881 encouraged the belief that vaccination would be completely protective. In the early nineties, when von Behring discovered the antitoxin of diphtheria and demonstrated its efficacy in the treatment of that disease, and later when he and Kitasato produced an antitetanic serum and demonstrated its value in the treatment of tetanus it was felt by many that eventually immunizing agents would be found for

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all diseases and thereby they would be conquered. Unfortunately, such has not come about. The element of luck undoubtedly accompanied these pioneer efforts in that the diseases first selected for experimentation were most adaptable to illustrate the various processes of immunization in their most favorable aspects. At present we are forced to the conclusion that no kind of immunization will protect at all times and under all conditions. Individual resistance or susceptibility to the same infectious agent makes it impossible to bring all individuals to the same degree of immunity. All we have a right to expect is that we may reduce a fatal to a non-fatal infection, cause a mild one to be so modified as to be unrecognizable, or furnish complete protection. The degree of modification to which a microörganism is subjected in its preparation for injection determines in large measure the degree of protection afforded by an immunizing treatment. However slight the reaction following the administration of an agent to produce active acquired immunity, there is reason to believe that there is some increase of the virus, this increase being necessary to stimulate the body cells to the production of antibodies. The problem that confronts us is so to regulate this stimulation that the individual may suffer the least possible injury.

There is an all too prevalent idea today that the microörganism of any disease will, if properly introduced into a susceptible individual, stimulate within that individual an immunity to the disease of which the organism is the cause, also that the finding of an organism associated with any disease calls for the administration of some sort of product of this organism in order to combat the disease. From this erroneous idea we have thrust before us in the literature of many concerns the spectacle of what seems to be a contest to incorporate in a given vaccine or bacterin the greatest number possible of species of bacteria without their having been proven of etiological importance; in other words, the tendency seems to be to forget that immunity is highly specific and requires for its production the specific organism of the disease. The mere occurrence of an organism in the organs of an animal suffering from a disease is not prima facie evidence of its having any primary significance or, for that matter, any significance at all. To illustrate, the B. choleræ suis was once looked upon as the active agent of hog cholera, largely because of its so frequently being found in the organs of animals dead from this disease. The use of a bacterin prepared from this

organism had little if any effect in controlling hog cholera. When the true cause of hog cholera became known its use in the production of an immune substance gave practically complete control of the pure form of the disease. Secondary invaders, such as the B. choleræ suis, are generally suppressed by controlling the primary agents of disease. To incriminate an organism as the etiological factor in any disease requires that it meet the requirements of the so-called "Koch's postulates," which are:

1. The suspected organism must be found in all cases of the disease under consideration.

2. The organism must be isolated and grown in pure culture.

3. Inoculation of the organism into suitable animals should reproduce the disease.

4. The organism must be isolated from such animal.

With few exceptions the above rules will apply to most animal diseases. Hog cholera, in which the virus is ultra microscopic, is one of the exceptions, but, using the living animal as a culture medium, this, too, will answer satisfactorily the requirements of Koch. The relationship of an organism to a particular disease may also be established through serological tests.

There is a well-defined distinction between the various bacteria with regard to the immunity produced as the result of their introduction into an individual. The ones most satisfactory are those acting entirely through their toxins; e. g., the diphtheria and tetanus organisms. Next in the scale are those producing acute septicemia and which are easily destroyed, such as the bipolar organisms. Those which produce a chronic condition are least satisfactory, and of these the ones producing the chronic condition running the longest course are lowest in immunizing properties. Of all agents used in the stimulation and production of immunity the living virus is the most efficient. This is demonstrated in practice in the use of anthrax and plague (human) vaccine and in the laboratory animal particularly by the use of living bacteria as antigens for the production of agglutinins, etc. The reaction induced by the use of living virus is very much like that brought on by the natural disease. The main objections to its use are the danger from an insufficient attenuation or modification of virulence and the difficulty of preserving the live organisms in the form of vaccine for long periods. Very few living organisms can be used with safety except they have been given some degree of attenuation. Some which have a selective

action for certain tissues have been found safe to use when injected unattenuated in tissues for which they have little affinity. At the Pasteur institute at Paris it has been shown that the typhoid bacillus is unable to produce disease unless it be administered through the gastro-intestinal tract and that subcutaneous injections of fully virulent culture are made without ill effects.

In the earlier periods of work on immunization it was the hope that bacteria of a type closely related to the real etiological factor, but harmless, might be utilized to confer an immunity against their closely related type and the real cause of disease. But continued study showed the high degree of specificity of immunizing substances. The harmless colon bacillus, so closely related to many of the disease-producing organisms of the colon-typhoid group that mild serological inter-reactions may be demonstrated, it would seem should stimulate an immunity for the harmful types, but such is not the case. More and more light has been thrown on this specific property of antibody production and the number of recognized immunizing bacteria has steadily decreased. The restricted circle of immunizing bacteria is well illustrated in the present knowledge of immunity in pneumonia. The serum which protects against an infection of one group of pneumococcus has no protective value against another, although culturally and morphologically the different types are the same. The acquirement of this specific property by bacteria is undoubtedly the result of their accommodating themselves to their host, and when removed from the host and cultured on artificial media they rapidly lose the same.

Theobald Smith in a paper before the Congress of American Physicians and Surgeons at Washington in 1916 stated that "In spite of the various objections to the method of living vaccines it is the coming method; not, perhaps, in our day. The opportunities for improving and fixing the vaccinal value and safety of immunizing strains have not yet been exhausted and here, as in other directions of preventive work, we must look to the results obtained from animal pathology in its dealing with natural diseases to give us courage to proceed."

Dr. Philip B. Hadley of Rhode Island has in his work with fowl cholera demonstrated the possibility of the use of avirulent strains of microörganisms as immunizing agents against virulent ones. He isolated one strain of the B. avisepticus which proved harmless to fowls and rabbits, yet which injected into these animals rendered them highly immune to the most virulent

strains. Perhaps such strains will be found among organisms of other diseases.

Second to the living virus in the production of immunity is the organism killed by heat or antiseptics. The so-called bacterins for various diseases form an important adjunct to the practitioner's stock of therapeutic agents. But, again, the fact of their specific action must be borne in mind. To use a "shotgun" mixture of microörganisms in the preparation of a bacterin for the treatment of a disease merely because all are found associated with it and in the hope that one or more of them may perhaps be the ones responsible for the condition is too crude a procedure to merit the interest of the intelligent practitioner. As with living vaccines, so with dead cultures; some confer an immunity, others do not. Success with one does not guarantee success with another. Those organisms whose antigenic properties depend upon the presence of certain products, such as toxins or ferments, cannot be expected to act satisfactorily when killed because the production of these ceases when the life of the bacteria ceases and the content in the microöorganism is not sufficient to raise the immunity level high enough to protect an individual from infection. The apparent success of immunization against hemorrhagic septicemia through the use of bacterins is most encouraging for this method of vaccination. A recent modification in the use of killed cultures is that of suspending bacteria before injection in an homologous immune serum (sensitized bacterins). These bacteria become saturated with immune bodies and in this condition quickly and with lessened reaction produce immunity. With certain types of bacteria, such as the typhoid bacillus and staphylococci, their use, as shown by Besredka, Gay, Murphy and others, is attended with success. Others, such as the streptococci, reported by Kinsella and Swift, are less valuable on experimental laboratory animals than the non-sensitized. Th. Smith accounts for the conflicting reports on the use of such sensitized bacterins by the inability to control the degree of saturation by any known methods of titration. He assumes an analogy between the union of antiserum and bacteria and that of toxin and antitoxin. With the latter he has shown that in a mixture of toxin and antitoxin the maximum immunity was produced when there was excess enough of toxin to produce a local lesion. With the quantity of toxin remaining fixed and the quantity of antitoxin increased, the active immunity decreased. It was still present when the mixture was just neutral—that is, produced no recognizable local lesion

in the living animal—but the immunizing properties were entirely lost when the antitoxin present was double the neutralizing dose. The increased immunizing properties of sensitized bacterins are doubtless due to the mixture's greater penetrating power. More tissue cells are stimulated and more antibodies are formed. The marked success of the simultaneous treatment of hog cholera may be due to the wider distribution of the virus under the influence of the immune serum. The possibility of unfavorable results with sensitized living bacteria is also apparent in that the more widely they are disseminated the greater their power of producing infection if their virulence is sufficient.

Doubtless what represents the most refined method of immunization is the use of separate parts of bacteria as antigen rather than the whole, either living or dead. On the theory that bacteria possess chief and secondary antigens, investigators have attempted to make use of the former and to exclude the latter, on the theory that liberal dosage of the former will result in sufficient resistance to overcome the infection entirely. For instance, Much has shown that the lipoid derived from the tubercle bacillus will, when injected, produce an immunity to tubercular infection. While this method of immunization is not yet in practical use, it promises much in that it would eliminate from vaccines their harmful and at the same time non-immunizing substances.

It is a well-known fact that tuberculin therapy in its early application fell into disrepute largely due to the lack of knowledge of antibody reactions and the cardinal principles of immunity. Of recent years, through painstaking work of many investigators, its prestige is being somewhat established and its value becoming recognized, while at the same time its possible dangers and limitations are recognized. So, too, Wright's method of vaccine treatment, while recognized as an unquestionably powerful therapeutic weapon, is, because of unskillful application, use in cases where not indicated, and commercialization, in danger of falling into the same disrepute. Its application is a serious procedure and demands careful control and the same preliminary training and study should be required of those who apply it as are required for all other branches of specialized medicine. The value of active immunization depends upon whether it is applied as a prophylactic measure or as a means of control after the disease has gained a foothold. For the former purpose it is a logical and rational method of treatment,

proven so in the case of smallpox, rabies and typhoid. Sufficient immunity to protect against accidental or spontaneous infections may readily be established, since the degree need not be much above normal. The application of the method in the treatment of a disease already established by the preparation of a product from the bacteria by which the disease is caused depends upon the condition of the individual case. Disease production following the entrance of a microörganism into the animal body depends upon two factors, the offensive powers of the organsim and the defensive powers of the body. If the latter are greatly in excess the organisms become localized and are rapidly destroyed and recovery results. In such case no form of treatment is required. If, to the contrary, the virulence of the organism is high and its offensive powers surpass the defensive powers of the body the infection becomes generalized, the tissues and blood streams are invaded and death is likely to occur. Here, again, active immunization is not indicated because already sufficient antigen is present if it could be utilized, and the small quantity contained in a bacterin would not be sufficient to change the outcome. To use a living vaccine at this stage would be folly, since already the body is overcharged. If the struggle between invading organism and the body is nearly equal, and the defenses are sufficient to check the infectious process so that it assumes a chronic, localized form spreading but slowly, if at all, encapsulation by fibrin or other tissue changes may occur, or pressure due to cell detritus may offer interference. In either case protective antibodies are diverted from the bacteria and combine with the obstructing mechanism and no form of immunization can be of help until surgical treatment removes the same. Systemic causes may at the same time operate to prevent the healing of a lesion. The supply of circulating antibodies may be sufficient to hold the lesion in abeyance, but owing to the small quantities of bacteria in contact with the blood stream there is insufficient antibody formation. This is an ideal condition for vaccine treatment. In generalized systemic infections where there is acute sepsis and bacteria are multiplying rapidly in the blood stream, and the defensive forces of the body are overwhelmed by the flooding of the bacteria, vaccines are useless and often harmful, since the tissues are already saturated with antigen, and if capable of antibody production this would certainly occur without the limited additional antigen contained in the vaccine. In a condition in which bacteria are in the blood stream but not multiply-

ing there, being given off by a local lesion such as endocarditis, and the case has assumed a chronic or subacute condition, the use of vaccines may be justified. The data at hand do not suffice either to warrant or condemn their use, but theoretically the treatment is sound.

In acute diseases, such as pneumonia, typhoid, hemorrhagic septicemia, etc., vaccine treatment during the course of the disease has little justification. In some of these the antibodies present are greatly increased over normal, but the patient is seriously ill in spite of no bacteria being demonstrable in the circulation. The use of vaccines in such cases, if it serves at all, can only serve to increase the antibodies which are already present in quantities far above the normal and sufficient to protect if they could only be utilized. The bacteria during the short course of the disease are in many cases extremely resistant to the action of antibodies, and the production of immunity is delayed until just before or at the crisis, and the introduction of vaccines could scarcely be hoped to alter the outcome. In acute infections which run a specific course there is no theoretical basis for vaccine treatment.

Time does not permit a full discussion of passive immunity. This type, as has been said, is produced by the introduction of a serum which contains antibodies and its effect upon an animal suffering from disease, barring the possibility of anaphylaxis, is harmless. In veterinary practice the principal antisera used are for tetanus, hog cholera, hemorrhagic septicemia, blackleg, anthrax and streptococcic infection. The results obtained with all except the latter are gratifying. The principal difficulties in the use of these in the past have been due to administration of doses too small to be of any marked benefit. To illustrate, only a few years ago the dose of tetanus antitoxin for the horse was recommended at from 500 to 1500 units. Larger dosages are now advised, but they are undoubtedly yet too small. In human practice the dosage recommended is the maximum, 10,000 to 20,000 units intravenously with repetition in from 18 to 24 hours with 5,000 to 10,000 intramuscularly. As a prophylactic, dosage of not less than 1,500 units is advised. With this treatment the mortality of the disease has been reduced from 80 or 85 per cent to 60 or 65. If such quantities are required for the human, how futile must be the small quantities used by veterinarians! The almost prohibitive cost of the treatment for large animals practically precludes the extensive use of this therapeutic agent, but

the same should not be condemned as worthless so long as the quantities used are so small.

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AMERICA'S DANGER IN THE NEW WORLD BATTLE FOR FOOD.*

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The problem of abolishing war is the problem of abolishing hunger. Today, with the Foch armistice in operation, the world is still in the midst of a battle for food. America is a participant in this battle, little as the well-fed minority of our people may be disposed to realize it, and we must acquit ourselves as well in the war that has not ended as in that which is just being brought to a close by negotiations in France.

Hunger caused the collapse of Germany. Let us see that it does not cause disaster to the Allies, now in the flush of their overwhelming victory. The morale of the German soldier in the trenches was weakened far more by the thought that his family at home was almost, if not quite, starving than by the battering of the Allies' war machine. The whole fabric of Middle Europe fell apart because its peoples could not face starvation year after year and keep up their courage.

We shall not need a League of Nations if we can conquer this most formidable belligerent of all, and if we have a League of Nations it will be powerless to prevent, even though it may lessen, war unless the food problem of the world is solved. If the League of Nations and the victory over hunger become parallel

*Presented at February Meeting, V. M. A. of N. Y. City.

influences, then indeed we may look reasonably forward to a period of protracted, perhaps even permanent, peace on earth.

Apart from the appalling destitution that has accompanied the war, there remains a permanent hunger problem, due to the great increase of the earth's population in the last hundred years and the wasteful neglect of proper development of the sources of food supply.

America's role of a bountiful provider has been a forced one. The great volume of supplies that we sent to help our Allies in their direst need was accumulated only by stinting our own people. This stinting, of course, has not fallen on the well-to-do; it never does. It has fallen chiefly upon a great part of our population, at least fifty per cent of the whole, which was insufficiently nourished before the war and has patriotically denied itself still further in order that the needs of our government might be achieved. It will be well to realize that the foremost task of reconstruction in America is to settle the food question here, and if we do not realize this our other political and economic virtues as a nation will not see us through the trying days that are to come.

The supply of animal food is at the basis of the nutrition of every people. How can we expect to continue long our complacent endurance of 70 cent bacon and 20 cent milk? We must find ways to break the force of this ominous situation or we shall be quickly brought to our senses.

Without going beyond the Empire State of our Union, we can see the facts clearly. Of the 22,000,000 acres of farm land in New York, only 9,000,000 are under cultivation. The animal food supply was one-half of the people's diet in 1840. Today it is less than one-third, and growing still less.

In 1870 there were 5,000,000 sheep in this State, but in 1916 the number had fallen to 400,000. Of the animals which remain $5,000,000 to $7,000,000 worth is lost annually from infectious and contagious diseases which should be prevented by proper control through a system of veterinary sanitary police.

Though New York is the richest state in the Union, the farm mortgage still haunts the agriculturist here. There are more of these mortgages in New York than in any of the Middle or New England states. We do not realize that we have more abandoned, idle and unprofitable farms than any other Eastern state.

What is the result of this? There is no more dire poverty or keener suffering in the world than is to be found on the lower

east and west sides of New York. Fifty per cent of the people of the state are without sufficient nourishment. Only recently we have been startled by statistics showing that 23 per cent of the school children of this city are underfed. A survey has disclosed that the average daily consumption of milk for approximately 6,000,000 people in the metropolitan district is one-half glass per day, though the minimum for a growing child should be one pint and a half per day.

There is another aspect of the problem. Last winter we had an average of seventy-five deaths a day in New York City from pneumonia for six consecutive weeks and an equal number of deaths from tuberculosis. These fatalities were due largely to under-nutrition.

It is a common fallacy to assume that the farmers are always well fed, even if the people of the cities lack. The truth is that at least fifty per cent of the population of America, city and country together, is not able to obtain sufficient food. The farmers are compelled in many cases to sell the best of their products in order to provide for debts and pressing needs in other directions, and they struggle along with what is left.

What is the remedy for this? I offer two main suggestions:

First, that we should establish community abattoirs and food conservation stations.

Second, that we should restrict our exports of food products so that the price levels in this country will fall within the reach of the average family.

The community abattoir is a means by which we can surely bring down the price of meat. Each abattoir so established ought to be in charge of a competent animal engineer, who would see that full use was made of the supply of animal food in the community and that the quantity of this supply should be steadily increased until it would become sufficient. One of his functions would be to reduce and eliminate infectious and contagious diseases among food animals, and thus cut off a great loss of which the public does not seem to be aware.

Another step would be to see that the farmer receives full value for his animals by conserving every pound, so that the hide, horns, hoofs and other products should be made to yield him the maximum revenue. Under the present methods of selling it is often the case that the producer loses $45 of the value of each animal through inability to market it properly.

The animal food conservation station would show the farmer how he could make a good profit from food animals; what he could grow best on his farm in order that he might maintain the largest possible number of animals with success; how each community might provide animal and vegetable food in abundance, wool for cloth, leather for shoes and numerous by-products of animals, such as glycerine, for community needs.

I should say that it would be a fair estimate that the establishment of these stations would reduce the price of meat fifty per cent, in addition to multiplying greatly the supply of other foods whose productivity and nutritive value depend so largely upon animal industry.

America is bountifully able to provide food for its own people, but we cannot do so if things are to continue thus out of joint in our economic system. We are a wasteful people, because once there were ample supplies for all when our rich farm lands were tilled by a comparatively few pioneers. Now, with a great and growing population, we are pinched. Retail prices of food are so high that a continuation of them is virtually impossible. Shall we continue to ignore our own dangers while realizing those abroad?

The success of our American system of republican government was based upon a sufficiency of food, which caused our people in the formative period of the republic to be strong, steady and clear-headed. We must go back to that sufficiency if we are to meet our opportunities in the new period of political and economic development which we face. Europe has shown us vividly that peoples who do not know where they are to get the next meal and whether that meal will be sufficient are a danger to the whole world. Let us be warned in time.

The Oklahoma State Board of Veterinary Medical Examiners will meet in Oklahoma City April 28, 29 and 30, 1919, for the examination of applicants who desire a license to practice in the state.

THE AMERICAN VETERINARY MEDICAL ASSOCIATION.*

N. S. Mayo, Secretary,
American Veterinary Medical Association.

It is not necessary, I am sure, to emphasize to you the need of organizations. There is not a trade, occupation, or profession in America, and one may say in the world, that is not organized. Individual effort can accomplish relatively little. When individual effort is organized it is great. As veterinarians, we have need of local associations to deal with problems of every-day practice and problems that are common to our profession in a given locality. Then there is need for a state organization that will enable us to cope with the problems that affect our own state, such as the laws governing practice, veterinary education, the control of transmissible animal diseases and the promotion of the live stock industry of the state. There is also need for regional associations, such as this and the Missouri Valley Veterinary Medical Association, that have still a wider sphere of usefulness and that shall take up regional veterinary problems in which they are particularly interested. In presenting to you the importance of the A. V. M. A., I also wish to emphasize the value of local, state and regional associations and to urge every one of you to join them, attend them, take part in the program and in the work of the association. And I want to assure you that the A. V. M. A. will assist as best it can in advancing the interests of these associations and the profession. It is due to Dr. V. A. Moore of the A. V. M. A. that I am here tonight to represent that association and to assist in this meeting.

The American Veterinary Medical Association was organized as the United States Veterinary Medical Association fifty-five years ago in New York City and the membership in those early days embraced the names of the pioneer veterinary educators and leaders in the United States. For many years the association was essentially an eastern association and the meetings were held in New York, Boston, Philadelphia and Washington. The first meeting held west of the Alleghanies was at Cincinnati in 1884 and the next western meeting was in Chicago in 1890. Since that time the majority of the meetings have been held in the central or western states; only once has the association met in a southern

*Address delivered before Southeastern States Veterinary Medical Association, Birmingham, Alabama, February, 1919.

state, when the meeting was held in Nashville, Tennessee, in 1897. Arrangements had been made to hold the 1914 meeting in New Orleans, but on account of the outbreak of foot and mouth disease the meeting was canceled. The meeting to be held next fall in New Orleans is the first to be held in the far south, and it is believed that it will be a valuable means of stimulating an interest, not only in veterinary work in the south, but will also aid in the development of the live stock industry in a region that is so well adapted to the purpose.

The work of the American Veterinary Medical Association for many years was devoted largely to the presentation and discussion of subjects of interest to the practicing veterinarian, and it was not until the Association began to hold some of its meetings west of the Alleghany Mountains that the Association became national in its scope and began to take an active part in dealing with national veterinary problems, such as legislation looking toward the proper recognition of veterinarians in the United States Army, the question of veterinary education and the control of transmissible animal diseases. Within the past ten years the growth of the American Veterinary Medical Association has been rapid, and at the present time there are more than 3,500 members, most of them in the United States and Canada, but some are scattered nearly all over the world, India, Japan, the Philippines, Hawaii, West Indies, Central and South America and the leading countries of Europe. Its membership, active and honorary, includes the leading veterinarians of America and the world. It is the largest, and I believe the most efficient, organization of its kind in the world.

In 1915 the A. V. M. A. established the official monthly journal that is now so ably edited by a distinguished member of this association, Dr. W. H. Dalrymple of Baton Rouge. This journal is a high-class magazine, presenting the best current literature of our profession; but also keeps the Association in touch with its members, as well as with other professions, the live stock industry and the veterinary profession of the world. If you are not a member of the A. V. M. A. and do not care to join you should certainly subscribe for this excellent journal.

Among the problems that are national in character, a few will be mentioned that have received the active support of the A. V. M. A.

For many years the veterinarian in the American Army was neither an officer nor enlisted man. The A. V. M. A. took up

the problem of the army veterinarians many years ago to secure a proper recognition for the veterinarian, as well as to secure an efficient organization of the army veterinary service, and it is due almost entirely to the efforts of the A. V. M. A. that the present organization was established. While the foundation for an efficient army service has been laid, there is still work to be done to put the service on a high plane, and this service will need outside assistance for some time to come.

Another important work of the A. V. M. A. has been to assist and support the Bureau of Animal Industry, the best organized and most efficient bureau of its kind in the world.

This organization, in coöperation with state and local practitioners, has stamped out of the United States two great animal plagues, contagious pleuro-pneumonia and foot and mouth disease, plagues that have ravaged Europe "So long that the memory of man runneth not to the contrary." You are also familiar with the splendid progress being made in the eradication of the cattle tick and the control of other animal plagues. The A. V. M. A. has not only actively supported the Bureau of Animal Industry but has also taken a prominent part in securing proper remuneration for veterinarians in the Bureau service. In peace, the B. A. I. is the largest single employer of veterinarians in America and the number will probably be considerably increased in the near future. The veterinarians in the Bureau have probably been the hardest worked and the poorest paid of any professional men. A substantial increase in their pay has just been secured from Congress. It must be remembered that whatever benefit accrues to veterinarians now in the service will also apply to veterinarians who may in the future enter the service.

Another problem that has received much attention from the A. V. M. A. has been veterinary education, and a tremendous advance has been made in the past few years. Entrance standards have been raised, the courses in the veterinary colleges have been lengthened and more thorough work done. It is evident that upon a thorough preparatory and technical training the future of the veterinary profession rests. At present veterinary education is undergoing a rapid transformation, particularly from private to state schools, and the problem is one that is receiving the most comprehensive consideration by the American Veterinary Medical Association. While the subject of veterinary education is essentially a national one, the advancement of veter-

inary education should receive the active support of every member of our profession.

When an appeal for help came from the stricken members of our profession in Belgium and France, it was sent to the A. V. M. A. through Professors Vallée and Liautard. Through the A. V. M. A. an appeal was made to the profession in America and more than five thousand dollars was raised by voluntary contributions. This is known as the "Liautard American Veterinary Relief Fund." This is for the relief of veterinarians and their families in the allied countries. Two thousand five hundred dollars have been sent to Professor Vallée in France and the families of American veterinarians who were in need have also been assisted.

Just as soon as the armistice was signed, problems developed in connection with reconstruction that affected our profession. To assist in dealing with these, committees were appointed by President Moore, both for the United States and Canada.

I have endeavored to give you a brief summary of the work and scope of the A. V. M. A. and the opportunity it offers for promoting the progress of the veterinary profession in all lines. In order to make substantial progress, we must have an organization that shall receive the active support of members of our profession. Every individual veterinarian owes it to his profession and to himself to join the A. V. M. A. and help make our profession in America what it should be—the best in the world. There are great problems that must be met and solved. America is essentially agricultural, and a permanent and successful agriculture rests upon the live stock industry. This must be protected and developed, and it is upon us as veterinarians that this responsibility rests. We must not only join our associations but each one individually must work toward these ends, for it is a good work well done that is the key to all substantial progress.

The American Veterinary Medical Association stands for the best interests of our profession. It stands for higher and more thorough education. It stands for a high professional ideal. It stands for the advancement of the live stock industry and for efficient veterinary service in the Bureau of Animal Industry, in the army, in the state and in the community. Membership in the A. V. M. A. is a stimulus to better professional service and to higher ideals. We need your active support and you need the A. V. M. A., for it will help you in your chosen profession and

in your service to humanity, and this is, after all, the measure of a real man.

I believe that the next meeting of the A. V. M. A. in New Orleans will be one of the best and most interesting in the history of the Association, and that substantial progress will be made and that the veterinarians of the new and progressive South will do their part in building up our profession, not only for this year, but for all time.

REPORT OF COMMITTEE ON INFECTIOUS ABORTION.*

Your committee reported at your 1917 meeting at some length on its efforts to summarize the knowledge of and opinions on the bovine infectious abortion problem of those representative veterinarians and live stock men of America who had had experience with the disease. No recommendations having in view the adoption of active measures to control the disease were made as a result of the committee's studies. Since our last report much water has gone under the bridge, but it has not been all clear water. The menace from the disease looms larger. It will not disappear of its own accord or without a supreme and unified effort on the part of all individuals and organizations concerned.

We commend the action of the American Veterinary Medical Association in appointing a committee to study this same problem. Two of the members of your committee are serving on that committee, and we have assurance that something of merit will be accomplished by the vigorous manner manifested by its chairman and individual membership in setting themselves to the task. The new committee referred to should undertake to establish new facts and a deeper and more comprehensive insight into the disease.

It appears to us that your committee should confine itself to the task of keeping your association in touch with the developments that proceed out of research and experience with the disease and of crystallizing the thought of those who are best qualified to think on this problem, with the result that more or less definite recommendations may be presented to you from year to year. We propose to present to you the annual increment of

*Presented at the 1918 meeting of the United States Live Stock Sanitary Association at Chicago, Illinois.

bibliography dealing with the great problem in order that it may be added to the rather comprehensive list already published by you and further to seek for your consideration a paper reviewing the accessions to our knowledge for the year and present by one in a position to command your attention.

Your committee wishes to present for your thoughtful consideration its conclusions as follows:

Bovine infectious abortion is in fact or potentially the greatest menace to the cattle industry of America. There is at hand sufficient evidence to warrant the conclusion that it is a dangerous communicable disease of cattle and possibly of swine if not of other domestic mammals but not of man. Moreover there are available physical and laboratory methods, based on the accepted belief that the disease is primarily due to Bact. abortus (Bang), to enable live stock sanitary authorities to make a reasonably accurate diagnosis (a determination of the presence or absence of infectious abortion in a herd) sufficient to satisfy the demands of intelligent and reasonable men, and it is not the part of wisdom or caution to hesitate longer to apply our knowledge to an official attempt to suppress the disease in spite of the acknowledged limitations of that knowledge.

Therefore, it is the best judgment of your committee that your association resolves that in its opinion:

Bovine infectious abortion is a dangerous communicable disease of cattle due to a specific germ, Bact. abortus (Bang), and that hereafter it shall be considered as such and as coming within the meaning of the laws or regulations of the states having general or special laws, or regulations, covering the handling of contagious diseases of live stock and that in other states laws or regulations should be forthwith adopted to bring the disease under official cognizance.

Regulations rather than specific laws, capable of adaptation to the changing conception and added knowledge of the disease and to local conditions, are recommended to the various state authorities for adoption.

Live stock sanitary authorities of the Federal government and of the respective states should immediately take steps to make public to the live stock interests of the country that bovine infectious abortion is a dangerous communicable disease of cattle, at least, and that it is a reportable disease within the meaning of the live stock sanitary laws and regulations of the nation and

state. Also, the Federal Bureau of Animal Industry and the respective state authorities should define, as their judgment and local conditions warrant, as clearly as possible, what constitutes the presence of the infection; i. e., what are the criteria by which a layman or a veterinarian may be guided in making a decision as to the diagnosis of the disease in a herd.

Penalties commensurate with the seriousness of the offense should be imposed in flagrant cases of violation of regulations covering the movement of infected or exposed animals, having in mind the prevention of the introduction of infected stock into healthy herds or into infected herds without the purchaser's knowledge of the consequences. The traffic in sterile or infected cattle should cease except for immediate slaughter or under such official sanction as will safeguard the cattle industry of the country.

There should be instituted without delay as a necessary economic measure a campaign of education of all live stock men relative to the seriousness of bovine infectious abortion and its consequences, such as interference with breeding and milk secreting functions, and relative to the measures that can be readily applied with assurance of at least partial success in the control of the disease; and adequate federal and state appropriations are urged for the furtherance of research into the nature of the disease and for the most effective methods of its suppression and control. To this end, we recommend federal aid for coöperation with the states that are in a position to coöperate effectively in studies on bovine infectious abortus.

WARD GILTNER,
G. M. POTTER,
E. S. BAYARD,
E. C. SCHROEDER,
T. H. FERGUSON,
Committee on Infectious Abortion.

[Note.—This report was not adopted but was referred back to the committee.]

CLINICAL AND CASE REPORTS.

TOOTH IN THE BRAIN.

Dr. E. Biart, Leavenworth, Kansas, reports having found a molar tooth in the cerebrum of a hog that was slaughtered for food. The hog was apparently normal in every way. The tooth was about the size of a hazel nut, and plainly showed the characteristics of a molar tooth.

UNUSUAL CASE OF QUADRUPLETS.

The following interesting case of bovine quadruplets has just been reported by Dr. John F. McKenna, Fresno, California. On January 29, 1919, Dr. McKenna was called to see a case of retained placenta in a two-year-old Holstein heifer which had just given birth to four calves. The first, a heifer, born January 28 at 2 a. m.; the second, a bull, born at 8 a. m. the same day; the third, a bull, born at 10 a. m.; and the fourth, a bull, which came at 11:30 a. m., but was born dead. The three first calves were all alive and able to stand in 24 hours. The mother was very weak and was placed on stimulant treatment, and the placenta removed. A report from the case on February 20 was to the effect that the three calves were alive and the mother in the best of health and doing well.

FOWL CHOLERA.

Subjects.—Variety of breeds, some pedigree utility strains, others common barndoor fowls, all obviously affected more or less when seen.

Symptoms.—The onset of the disease was sudden; client noticed the birds, as he termed it, squirting, and the excrement passed had an offensive odor and adhered to the feathers about the vent, staining it whitish yellow to greenish or brownish color. Loss of appetite, great prostration, staring feathers. The birds moped, or sat around with tails and heads down, combs dark

colored, swaying gait, trembling, extreme thirst and severe diarrhœa, high fever, and rapid emaciation present.

Post-Mortem.—Liver enlarged, dark colored, and tears easily. The intestines were congested and contained a frothy material. Hemorrhagic enteritis. Spleen enlarged. Small (petechiæ) present on heart and coverings (pericardium). Epicardium, kidneys dark and enlarged. Blood does not coagulate readily. Owner found dead birds in the nest, which made him think someone had poisoned them.

Diagnosis.—Fowl cholera, after post-mortem.

Prognosis.—Unfavorable.

Treatment.—All the sick birds were removed from the nest, and dead ones cremated. The hen-houses and nests were cleaned with McClintock's germicidal soap and sprayed with limewash and carbolic acid. The houses and perches were creosoted and fumigated with sulphur and formaldehyde.

Medicinal Treatment.—

Zinc Sulpho. Carb.....grs. 15
Sodium Sulph.....grs. vii
Hg. Bichlorid.....grs. vi
Acid Citric.....grs. iii
M. haust.

Sig.—This was dissolved in a gallon of water and given to the birds in place of drinking water at troughs, which were scrupulously cleaned.

Diet.—Sour milk, dry food, containing powdered charcoal; no hot-mash food allowed.

Hygiene.—The birds were fed out of troughs previously disinfected, and not off the ground. The yard was disinfected daily with Jeyes' fluid and covered with fine wood turnings, which were afterwards burnt along with excrement.—Henry B. Eve, M. R. C. V. S., Folkestone, in *Vet. Journal.*

The American horse, so writes The Listener in the Boston Transcript, has won peculiar honors in the great war, as well as the American Indian. The English captain, Sidney Galtrey, in a book entirely devoted to "The Horse and the War," declares in so many words that the Yankee horse "is the real equine hero of the war."

ABSTRACTS.

FIBROMA OF THE TESTICLE IN DOMESTIC ANIMALS.

R. Galli, in *Il Nuovo Ercolani* of 1913, published an article on this subject which is of some interest from the great rarity of fibromata of the testicle in animals, and from the fact that it records three characteristic cases.

The fibromata are benign tumours. They vary in size from that of a pea to a man's fist, and present a small lobulated surface. They are movable and hard; and sometimes they are not uniform. Sections show a shining aspect, a compact texture, a white or yellowish color, and a periphery which is rounded or has more or less pronounced excrescences. There may be calcified or ossified zones in which the sectioning knife encounters great resistance. On account of the compression caused by these tumours, the tissues constituting the scrotal diverticula tend to excoriation and ulceration. Fibromata grow slowly, and attain a great size. They sometimes undergo sarcomatous transformation, and may then grow rapidly.

Of the author's three cases, the first was in an old ass, the second in a young ass, and the third in an old horse. Very clear and demonstrative microscopic preparations were obtained by staining sections by Van Geissen's method. In all the cases, the typical texture of the fibroma was observed.—*Revista de Higiene y Sanidad Pecuaris.* (Vet. Rec.)

WHAT IS "PTOMAIN" POISONING?

Under *Current Comment*, the Journal of the American Medical Association, March 8, 1919, has the following to say with regard to "ptomain" poisoning, which may be of interest to some of our readers, as we have recently heard of a diagnosis of this kind having been made in connection with the deaths of a number of mules after arrival at a Southern point:

The term "ptomain" poisoning, says The Journal, has become a cloak for ignorance. Jordan (Jordan, E. O.: Food Poisoning, University of Chicago Press, 1917) says that "ptomain poison-

ing is a convenient refuge from etiologic uncertainty." In fact, any acute gastro-intestinal attack resulting from a great variety of causes is apt to be called "ptomain" poisoning. Selmi, in 1873, first used the word ptomain (from the Greek meaning a corpse) to include the poisonous products of putrefaction which gave the reaction then looked on as characteristic of vegetable alkaloids. From the time of Selmi, when ptomains were regarded as animal alkaloids, our conception of these substances has changed markedly. The last attempt to give precision to the term was by Vaughan, who defined ptomains as intermediate cleavage products of protein decomposition. Rosenau and his associates at Harvard have been searching in vain for the past year and a half for ptomains that might cause gastro-intestinal or other symptoms.

Split products of protein putrefaction are readily isolated. Some of these products have physiologic activity, but none of them thus far have been demonstrated to be poisonous when taken by the mouth. The so-called ptomains isolated and described by Selmi, Nencki, Brieger, Schmiedeberg, Faust and Vaughan were usually obtained from putrid organic matter that had decomposed past the point at which it would be used as food. Furthermore, most of these substances were tested by injecting them subcutaneously or intravenously into animals. Many substances are poisonous when thus introduced parenterally, though they may be harmless by the mouth. Again, many of the so-called ptomains isolated and described have since been shown to contain impurities. Chemists are now seldom confident of the purity of protein fractions, even when obtained in crystalline form. The chemical search for split protein products as the cause of "ptomain" poisoning has practically been abandoned. Most of these split products are amins, which are either not poisonous at all, or no more so than their corresponding ammonia salts. The chemical resemblance between muscarin and cholin has directed the work toward the phosphatids, but thus far this line of research has not helped solve the puzzle of "ptomain" poisoning. Chemists avoid the use of the word ptomains, for the reason that it lacks precision. This is a curious instance of the popular use of a technical term that sounds well, but means little. Only clinicians cling to it as a convenient refuge.

Ptomain is a term for chemical substances of uncertain origin, unknown nature, and doubtful existence.

PSEUDO-TUBERCULOSIS OF THE PIG (CASEOUS ADENITIS) AND VISCERAL PSEUDO-TUBERCLES.

Caseous glandular lesions in the form of nodules, or more rarely of visceral tubercles, which it is difficult to distinguish from tuberculosis, are frequently found in the pig. Chaussée, in *La Recueil de Médecine Vétérinaire* of last year, published the following account of these conditions.

The author relates five cases of this nature, in which inoculation into guinea pigs proved that the lesions were not bacillary, while the naked eye exmination could give no certainty on the point. These observations enabled him to gain a more exact knowledge of the two classes of lesions.

One of these five observations is here given. A pig of fifteen months old, in excellent condition, had both the maxillary glands very slightly hypertrophied. In each of these glands, some fifty caseous points were found. They were hard, had no fibrous envelopes, were of a yellowish cream color and from one to seven millimetres in thickness. The intermediary glandular tissue was gray, clearly distinct from the lesions, in full vitality, and apparently normal. There were no other visceral lesions. When one of the "pseudo-tubercles" was crushed and microscopically examined, no tubercle bacilli were discovered. The inoculation of guinea pigs confirmed the non-tubercular nature of the condition.

This example and the other cases reported by the author show that nodular caseous non-tubercular lesions of the lymphatic glands exist fairly frequently in the pig. Their differentiation from tuberculosis is not always easy, and is based upon the following characters.

The non-tubercular nodules are not regularly spherical, and have no fibrous envelope. Their caseation is complete and uniform, dry, and with calcification. Their color is that of gum, or greenish.

In the lesions due to Koch's bacillus the nodular form is rare in the glands of the pig. Glandular tuberculosis is generally of the hypertrophic type, with complete or incomplete degeneration in the form of masses extended over the whole of the major part of the gland. If these tuberculous lesions are of some months' standing, the viscera are usually affected by generalization, while in "pseudo-tuberculosis" they are generally intact. In one of the author's cases of "pseudo-tuberculosis," however, tubercles

were found in the lung and the liver, but these were much harder and more calcified than lesions due to the tubercle bacillus. In cases in which tuberculosis and "pseudo-tuberculosis" co-exist the double diagnosis may be difficult, but to recognize the presence of tuberculosis is sufficient.

The lesions of this "pseudo-tuberculosis" are easy to distinguish from parasitic tubercles of the liver—echinococci, and cysticerci.

Not having been able to make the necessary cultivations and inoculation, the author has not investigated the cause of this porcine "pseudo-tuberculosis." He regards the lesions as probably caseous sequestra, due to a previous benign infection of the digestive apparatus. His sole object in publishing his article is to show that it is necessary in practice to know that these lesions exist, and to distinguish them from tuberculosis due to Koch's bacillus.—*Revista de Higiene y Sanidad Pecuarias.* (Vet. Rec.)

ARMY VETERINARY SERVICE

CONFERENCE OF VETERINARY CORPS.

At a conference of members of the Army Veterinary Corps, held in St. Nazaire (Loire Inferieure), France, February 7-11, 1919, the following program was executed:

SATURDAY, FEBRUARY 8.

Morning—Opening address, Chief Veterinarian, A. E. F. Summary of work in hand, Lieutenant Colonel Edmunds. Organization into sections.

Afternoon—Post-mortem on seven animals of Veterinary Hospital; reactors from I. P. test, January 22, and on animals which reacted to blood test, January 22, but not to I. P. test. Majors Merillat, McKillip, Gould, Ratigan and Captain Jervis.

SUNDAY, FEBRUARY 9.

Morning—The various mallein tests compared, Major Hilty. Value of the laboratory tests, Lieutenant Liebold. Blood test on animals which did not react, January 22, Captains Zingher and Weiss, M. C. Technique of I. P. test, Captain Balthaser.

Afternoon—Mallein I. P. test on 4,000 animals, Veterinary Hospital and Remount.

MONDAY, FEBRUARY 10.

Morning—Discussion on seven animals from Remount, killed and posted. Majors McKillip and Ratigan and Captain Jervis. Result of Pasteur Laboratory on some animals, Major Rappin and Captain Jervis. Result of Base Laboratory, Captains Zingher and Weiss, M. C. Classification of reactors, Major McKillip.

Afternoon—Reading reactions, Majors McKillip, Merillat, Ratigan, Gould and Captain Balthaser.

TUESDAY, FEBRUARY 11.

Morning—Discussion on result of post-mortem, February 8, Majors Merillat, McKillip, Gould, Ratigan and Captain Jervis.

Afternoon—Address, Lieutenant Colonel Aitken, of British Army. Address, Lieutenant Colonel Broque-Ruseau, of French Army. Organization of Veterinary Corps, Chief Veterinarian, A. E. F.

Evening—Banquet.

Captain Howard N. Beeman, formerly Veterinarian of the 10th Division, Camp Funston, Kansas, has been transferred to Camp Meade, Maryland, as Camp Veterinarian.

Captain Joseph F. Crosby, formerly Veterinarian with the 19th Division, Camp Dodge, Iowa, has been transferred to Camp Grant, Illinois, as Camp Veterinarian.

Lieutenant Herbert B. Nixon, formerly stationed at New York City, has been honorably discharged from the service.

Captain Herbert J. Brotheridge, formerly at Auxiliary Remount Depot, Camp Johnston, Florida, has been honorably discharged and has been succeeded by Lieutenant Earl S. Markham.

Lieutenant Harve Frank, formerly at Camp Funston, Kansas, has been honorably discharged.

Lieutenant Guy J. Phelps, formerly at Camp Travis, Texas, has been honorably discharged.

Major Robert C. Musser has been directed to report at Camp Lee, Virginia, for duty as Camp Veterinarian.

Captain Morgan B. Lamb, formerly of Camp Lee, has been ordered to report at Camp Bowie, Texas, for duty as Camp Veterinarian.

Majors Klein and Gilliland received honorable discharges from the Army early in February and have returned to their former vocations.

Lieutenant-Colonel C. J. Marshall received an honorable discharge from the Army February 20 and has returned to Harrisburg, Pennsylvania, to resume his duties as State Veterinarian.

The latter part of January, Major Pierre A. Fish received a communication from Professor Vallée in France notifying him that he had been elected an honorary president of the Anglo-American-Franco-Belgian Veterinary Relief Fund. The Journal desires to extend to the Major its hearty congratulations.

The Journal has received the news, unofficially, that Colonel D. S. White has returned from France, having been honorably discharged, and has returned to his home at Columbus, Ohio.

Lieutenant Charles E. Caulfield, of New York, attached for a time to the Army Veterinary Corps, has been sent to France to aid in the work of reconstruction through the Knights of Columbus service.

Lieutenant F. T. O'Sullivan, of New York City, with the American Expeditionary Forces, has returned to this country. Lieutenant O'Sullivan was with Major Knowles, of Helena, Montana.

Captain Charles S. Chase, Lieutenant A. J. Ward, Lieutenant Joseph P. Mack and Lieutenant A. J. Allott, of the Army Veterinary Service, have been released from service and returned to practice in New York.

Captain H. Ticehurst, of Morsemere, and Lieutenant William P. Grimes, of Hawthorne, New Jersey, have been released from Army Veterinary Service duties, the former having resumed practice and the latter his position in the B. A. I.

Lieutenant E. B. Parker has received his discharge from the army and has returned to his home in Newton, Illinois, where he has entered practice.

Lieutenant W. J. Walsh, formerly of Camp Greenleaf, has returned to his home in Creston, Iowa.

Dr. Hartwell Robbins has been transferred to Washington, North Carolina, from Atlanta, Georgia, where he has been in B. A. I. service.

The Veterinary Examining Board for the State of Colorado is composed of the following members: Dr. G. H. Dickey, Colorado Springs; Dr. R. H. Bird, Greeley; Dr. A. N. Carroll, Pueblo.

ASSOCIATION NEWS.

AMERICAN VETERINARY MEDICAL ASSOCIATION.

INTERNATIONAL COMMITTEE ON BOVINE TUBERCULOSIS.

Publication of this committee, appointed by Pesident Moore, was inadverently omitted in previous numbers of The Journal, the original personnel of which was as follows:

J. G. Rutherford (Chairman), Canadian Pacific Railway, Calgary, Alberta; Jacob Traum, University of California, Berkeley, California; C. E. Schroeder, B. A. I., Bethesda, Maryland; J. G. Wills, 27 Matilda Street, Albany, New York; *S. H. Ward, State Capitol, St. Paul, Minnesota; J. J. Ferguson, Honorary Member, c/o Swift & Co., Chicago, Illinois.

*Owing to the unfortunate death of one of the valued members of the committee, Dr. S. H. Ward, President Moore appointed Dr. Charles E. Cotton, State Capitol, St. Paul, Minnesota, to fill the vacancy.

SECRETARY'S OFFICE.

A form letter with statement of dues to the A. V. M. A. has been prepared and sent out to all members who have not paid their dues for the current year. Members must bear in mind that the United States postal regulations do not permit journals to be sent unless the subscriptions are paid. The names of those who are delinquent must be stricken from the subscription list of the journal. Send in your remittance promptly and keep your journal coming regularly. Don't forget this!

OTHER ASSOCIATIONS

MASSACHUSETTS VETERINARY ASSOCIATION.

The regular monthly meeting of the Massachusetts Veterinary Association was held at Boston, Massachusetts, February 26.

One new member was admitted to membership and applications from two veterinarians were read and laid on the table until next meeting.

The resolution of the United States Live Stock Sanitary Association relative to Federal control of interstate distribution of tuberculin was taken up and discussed and the association went on record as approving the action taken by that association at their December meeting regarding same.

HARRIE W. PEIRIE, Secretary.

KENTUCKY VETERINARY MEDICAL ASSOCIATION.

The annual meeting of the Kentucky Veterinary Medical Association was held at Seelback Hotel, Louisville, Kentucky, Feb. 5, and was one of the most enthusiastic and successful ever held by the association. The papers and reports presented were interesting and the discussions were lively.

Dr. Charles F. Fisher presented a paper on "Cattle Practice and Some of the Conditions We Are Called Upon to Treat."

Dr. S. F. Musselman, State Veterinarian, gave a very interesting report on the control of hog cholera. From a loss of $2,000,000 in 1917 there has been a reduction to about $300,000 in 1918. This accomplishment goes to show what is possible by coöperation.

Dr. Gibson, in charge of tuberculosis control work, B. A. I., presented a paper on "Tuberculin Test and the Accredited Herd System."

Dr. H. Gieskemeyer gave an interesting talk on "Diseases of Hogs," and also told of his field experience in the use of hemorrhagic septicemia bacterins on 10,150 head of hogs during the months of December and January.

The following officers were elected for the ensuing year:

President—Dr. W. H. Simmons, Extension Veterinarian, College of Agriculture, University of Kentucky, Lexington.

First Vice President—Dr. Charles W. Fisher, Danville.

Second Vice President—Dr. Ed. Calldemeier, Louisville.

Third Vice President—Dr. F. O. Schneider, Frankfort.

Secretary-Treasurer—Dr. Harry Gieskemeyer, Fort Thomas.

Executive Committee—Dr. R. L. Pontius, Lexington; Dr. Henry Harthill, Louisville; Dr. D. E. Westmorland, Frankfort; Dr. G. P. Isbell, Hopkinsville; Dr. G. W. Pedigo, Glasgow.

The next meeting will be held at the University of Kentucky, Lexington, June 18-19.

HARRY GIESKEMEYER, Secretary.

MISSISSIPPI STATE VETERINARY MEDICAL ASSOCIATION.

The thirteenth annual meeting of the Mississippi State Veterinary Medical Association was held in Greenville, Mississippi, at the Cowan Hotel, Norton Brothers' Hospital and the Chamber of Commerce on February 4-5.

This, as was shown by an unusually large attendance and much enthusiasm, was the best meeting of its kind ever held in the State of Mississippi. The association received the coöperation of many visiting veterinarians from other states, among whom were:

Dr. H. Jensen, Dr. J. D. Reardon, Dr. Johnson of Little Rock, Dr. J. W. Scheibler, Jr., Dr. Buck and Dr. Cochran of Memphis.

The association also enjoyed the hearty coöperation of the B. A. I. forces in Mississippi.

On the morning of February 4 the meeting was called to order at the Elysian Club by the President, Dr. Edwards of Vicksburg. The association was given an address of welcome by Rev. Phillips G. Davidson of Greenville. Dr. J. A. Barger, inspector in charge of tick eradication forces in Mississippi, made a very interesting response.

Mr. R. S. Wilson, who has charge of the demonstration forces in Mississippi, gave a very interesting address on the progress made by the extension forces in Mississippi since he has been in charge. He also made several interesting remarks in regard to the relationship of the work of the demonstration agents and the veterinarians, in which he said that as Mississippi became better supplied with graduate veterinarians such veterinary work as demonstration agents are doing now would then be placed in the hands of the veterinarians.

The next was a paper from Dr. Eichhorn of Pearl River, New York, read by Dr. J. D. Reardon of Kansas City, Missouri, on the control of some of the infectious diseases and the conservation of our live stock.

Dr. H. Jensen of Kansas City, Missouri, gave a very intelligent talk on what we have learned about biologic products.

Dr. W. M. L. Gates of Clarksdale, Mississippi, read a very practical paper on anthrax and its control in Mississippi.

Dr. H. L. Fry of the B. A. I. on hog cholera control work in Mississippi, read a very instructive paper on hog cholera.

Dr. J. J. Jones of the tick eradication forces in Mississippi, made a very interesting talk on the value of tick eradication to Mississippi veterinarians.

On the evening of February 4 the association assembled at the Chamber of Commerce for a business session. The following officers were elected for the incoming year:

President—E. S. Norton of Greenville.

Vice President—J. T. Alston of Tupelo.

Secretary-Treasurer—J. A. Barger of Jackson.

The following were appointed on committees:

Executive Committee—W. M. L. Gates, J. A. Brown and B. T. Huston.

Legislative Committee—Hudson Chadwick, W. M. Ferguson and H. O. Moore.

Diseases Committee—Jno. Olive, J. T. Alston and C. L. Allen.

Program Committee—J. A. Beavers, H. L. Fry and L. I. Lucey.

Dr. W. R. Edwards of Vicksburg was elected as a member of the State Veterinary Examining Board to fill the unexpired term of Dr. James Lewis, deceased.

A motion was made that resolutions concerning the death of Dr. James Lewis of Greenville, Mississippi, be drafted and sent to the American Journal of Veterinary Medicine and the Journal of the American Veterinary Medical Association for publication. A committee was also appointed to draw up resolutions relative to the death of Dr. Taylor of Gulfport, Mississippi, and Dr. Burrass of Boonville, Mississippi.

The association instructed the Secretary of the Mississippi State Veterinary Medical Association to donate $100.00 to the American Veterinary Medical Association for the benefit of the New Orleans meeting if called upon.

On Wednesday, February 5, the association held a very interesting clinic at Norton Brothers' Hospital, which took up the entire day. Many up-to-date surgical operations were performed and were witnessed by live stock men in the vicinity of Greenville.

In the evening a banquet was held at the Cowan Hotel, which was very much enjoyed by the association and visitors. Dr. J. A. Barger presided as toastmaster in his usual entertaining way.

Dr. Shipp, sanitary inspector of the State Board of Health, made a very interesting talk on sanitation. Dr. Shipp was a

guest of the association and his presence was very much appreciated.

The most enjoyable feature of the banquet was a musical entertainment given by Dr. and Mrs. Barclay of Jackson entitled "Musical Episode from Life."

After the banquet the body adjourned to meet again in Jackson in 1920. J. A. BEAVERS, Secretary.

MISSOURI VALLEY VETERINARY ASSOCIATION.

Nearly three hundred veterinarians were registered at the mid-annual meeting of the Missouri Valley Veterinary Association held at the Coates House in Kansas City on February 11, 12 and 13. This is the largest attendance of graduate veterinarians during the twenty-six years of the association's history.

The program was opened by the report of the Committee on Examination, made by Dr. D. F. Luckey, chairman of the committee. He called attention to the confusion existing in shipping regulations in different states and the frequent conflicts between state and federal regulations, and made a strong plea for the establishment of uniform rules with which shippers, veterinarians and railway employees might easily become familiar.

Dr. H. S. Murphey reported for the Committee on Surgery, laying special stress on wound treatment. The importance of removing damaged and devitalized tissues was emphasized. He also gave considerable attention to the value of Dakin's solution in the treatment of wounds in animals, stating that experiments had failed to show its superior properties in veterinary practice.

A very comprehensive and well-prepared paper on the control of infectious abortion was given by Dr. G. F. Jungerman. The cardinal points in the control of this disease are cleaning up of infected premises, segregation of infected animals, removal of retained placentas and thorough cleaning up of affected cows, using for irrigation purposes a weak solution of liquor cresolis compositus every three days. In addition to these measures, bacterin treatments given in series of not less than six injections are recommended.

Blackleg and its control was the topic of a paper rendered by Dr. L. W. Goss. He gave a review of the various methods of immunizing cattle against this disease, together with comparative studies of natural aggressin and a culture filtrate prepared at the Kansas Agricultural Experiment Station. In a rather extensive

use of this culture filtrate, he finds that the immunity after the first five to ten days compares very favorably with that following the use of natural aggressin. A few members in discussing this paper stated that in their hands several culture filtrates had been used with not the best success. However, no adverse reports were made by any one who had used the Kansas product.

Dr. H. S. Murphey reported on some interesting cases in dentistry and described an operation for saving the testicle in ruptured pigs which had been the means of making valuable breeding animals out of what otherwise would have been meat hogs.

Regarding dental affections, he states that practically all dental cases involving the first, second or third cheek teeth in young horses at the time of eruption of the permanent teeth, accompanied with bony enlargement, are due to infection, and recommended extraction and destruction of tooth-forming membranes as a logical treatment.

Dr. N. S. Mayo gave an interesting paper on the treatment of wounds with chlorazene and dichloramin-T, illustrating their use with a series of motion pictures.

Dr. J. W. Connaway gave a very able discourse on bacteremia and disease transmission, laying special stress upon anthrax, tuberculosis and hog cholera.

Dr. J. W. Parker presented some new ideas relative to irregular reactions to the tuberculin test. He stated that on autopsy in abattoirs 20 per cent of reacting animals showed no microscopic lesions, while, on the other hand, occasional non-reactors showed extensive lesions. His explanation of this latter condition is that progressive production of toxins in the body results in a maximum of metabolism which is not increased by the introduction of the toxins of tuberculin.

Dr. W. H. Bailey presented a paper on passive hyperthermia. Thermotaxis was ably discussed from both the physiological and pathological points of view.

Dr. J. C. Flynn reported on some of the unusual cases he had encountered in canine practice. Among these were three cases of pancreatic atrophy characterized by ravenous appetite, emaciation and the passage of a peculiar pulpy, adherent form of feces. The most unusual case, and one which the Doctor stated would probably not be believed by any of his audience, was a case of a dog whose pylorus had been obstructed by fibrous tissue, re-

sulting from a large sternal abscess, for a period of over two years. During this time the dog would eat in a normal manner but after two hours would vomit up the stomach contents. The owner stated that there had been no evacuation from the bowels for over two years, which the Doctor satisfied himself was correct, after holding the dog under close observation for several days' time. Autopsy showed the intestinal wall to be greatly atrophied and of papery consistency.

Dr. W. E. Stone reported for the Committee on Therapeutics on the intravenous use of iodine and arsenical compounds. In his hands, arsenic administered in this way has not proven efficacious in destroying circulatory parasites.

Dr. Arthur Groves gave a clear-cut description of the immunization of hogs as conducted by the B. A. I. in the Kansas City stockyards. The results of the method have been uniformly good and have proven a boon to the stock hog industry.

Papers by C. M. McFarland and C. E. Salsbery dealt with mixed infections in swine, each author giving his findings relative to the organisms present in such cases. There seemed to be a close agreement in their work, conducted entirely independently. Dr. McFarland mentioned the work of Proescher with the so-called micrococcus of hog cholera. This organism has been cultivated to the 42nd subculture and produced typical hog cholera in hogs inoculated with the 6th subculture, from which it had been repeatedly recovered, and again proved pathogenic. The authors agree that bacterial vaccines for mixed infections should contain at least 50 per cent Bacillus suisepticus, the balance being made up of the other invaders, such as colon, paratyphoid and suipestifer bacilli.

Dr. W. F. Brownlee read a well-written paper praising the results of serum and bacterial vaccines in mixed infections of swine when used with proper discrimination.

The last day's program was devoted to the problem of sheep diseases. Dr. I. E. Newsom reported on the investigations of sheep losses in Colorado, which he finds are largely due to hemorrhagic septicemia. So satisfactory has been the preventive treatment with bacterial vaccines that he recommends this procedure to those who are assembling lambs for feeding purposes. He reported on 28,833 animals in affected herds; the loss at the time of vaccination totaling 488, with 1,281 sick. The losses after vaccination were only 338. The owners in practically all cases were entirely satisfied with the results of the treatment.

Dr. E. T. Baker gave a very practical discussion of sheep diseases with appropriate means of treatment or control. He emphasized the growing importance of sheep-raising and the necessity of veterinarians familiarizing themselves with the characteristics of the different breeds and the anatomical and physiological peculiarities of these animals. He classified the various common diseases and described their treatment in an entirely practical manner, at the same time injecting considerable levity, which often put his audience in an uproar.

The banquet on the night of the 12th was largely attended, the number of ladies present being particularly commendable. Dr. N. S. Mayo served as toastmaster and called upon representatives of the Kansas City Live Stock Exchange, Stock Yards Company, B. A. I. and the Army Medical Service.

Mrs. Ashe Lockhart carried away the honors of the evening in a splendid toast, "The Veterinarian's Wife." Captain Daniel LeMay, a charter member of the association, spoke feelingly of his long experience in the regular army on the eve of his final retirement to civil life.

Dr. H. H. Silverforb had charge of the entertainment for ladies and deserves great credit for his carefully arranged program. Other members of the local arangements committee also deserve much credit for their efficiency work.

Special committees were appointed to report at the next meeting on the matter of live stock shipping regulations and the revision of our classification of swine diseases.

Resolutions were passed on the death of Dr. W. S. Nichols of Ravenna, Nebraska, the only member whose death has been reported within the past six months.

The next meeting will be held at Omaha, as usual; the time probably being early in July. R. F. BOURNE, Secretary.

ASSOCIATION OF STATE AND PROVINCIAL VETERINARY COLLEGES.

The Committee on Methods of Teaching Surgery of the Association of State and Provincial Veterinary Colleges, consisting of Dr. C. A. Cary of Auburn, Alabama, Dr. H. E. Kingman of Fort Collins, Colorado, and Dr. J. N. Frost (Chairman) of Ithaca, New York, rendered the following report:

The methods of teaching surgery should be divided into five groups: first, the basic training, which leads up to surgery;

second, classroom or text-book work; third, laboratory work; fourth, clinics; fifth, experimental work.

Since pathology and anatomy constitute part of the surgeon's basic training, they relate to the subject at hand, so there should exist a direct correlation between these subjects and the subjects taught under the heading of surgery that the basic and advanced training may be cemented into a well-rounded understanding of conditions demanding surgical attention.

The basic training should be planned with the definite purpose of applying the knowledge obtained when the opportunity arrives; that is, when the student is confronted with a case for diagnosis or treatment.

It is the common experience of instructors of advanced subjects that a great deal of time must be consumed in instruction in anatomy and pathology when it should be necessary only to build upon these subjects in making a final diagnosis.

The pathology of some of the more common surgical conditions, such as fistulous withers, poll evil, laminitis, sinking of the os-pedis and hygroma of the so-called mucus bursæ, should be more thoroughly understood and taught. Too much of our pathology refers to the human and not to veterinary conditions and too much time is spent in microscopic pathology in proportion to gross or macroscopic pathology.

We believe that a course in surgical anatomy, given in the same year as the surgical instruction that the student might have the subject fresh in his mind, would be of benefit. As the practice of veterinary surgery is coming to deal more and more with other species of animal rather than the horse, the teaching of anatomy should also deal more fully with the cow, sheep, pig and dog.

The classroom or text-book work in surgery should be augmented or illustrated as far as possible by the material in the clinic or laboratory. We believe that a large part of the classroom work should be in the form of a quiz, either written or oral.

Specific operations for certain of the more important diseases of the horse are fairly well described in our text-books. There is a lack of a good text of surgical technique and also of the operations for surgical diseases of the cow, sheep and pig.

In order that a surgeon may perform a good surgical operation he must know, and be able to practice, various forms of restraint. This must include not only the restraint of the horse but of all the domestic animals. It must also include restraint

in the field as well as in the hospital. The laboratory should provide a place for the student to first learn and practice these methods.

Here also he should be taught surgical technique, including preparation of the field of operation, the use of antiseptics and the use of both general and local anesthesia. Considerable time should be spent in the teaching of the preparation, administration and uses of local anesthesia, as this is important both from a surgical and humane standpoint.

By using anesthetized subjects which are later destroyed the student may be taught to become proficient in the preparation of the field of operation, use of instruments, control of hemorrhage, and to complete those operations which he will be called upon to perform in his profession.

This not only teaches the student to use instruments and carry out the operation, but it serves to give him confidence and likewise teach him the dangers of the different operations. It is only by actual practice that these things can be learned, and we believe that these surgical exercises should include all of the domestic animals, both large and small.

After a certain amount of proficiency has been reached in the laboratory, the student may be allowed to assist in the clinic with the major operations or perform the minor ones.

The clinics are one of the most important branches in the teaching of surgery. Here it is that the student sees or assists in performing actual work. With good clinical material, the classroom work may be illustrated, which tends to fix the subject more firmly in the mind of the student.

In connection with the clinic a hospital should be maintained so that the student may be given an opportunity to follow the course of the cases which he has seen operated upon. Here he should be trained thoroughly in the preparation of the patient and the after-care and treatment, which is many times of more importance than the operation itself.

The patient should be under the direct care of the student, who, under the supervision of an instructor, is required to dress the case daily, noting the different effects of the dressing agents and watching the process of healing. It is only by understanding these things thoroughly that a student will later be able to give a reliable prognosis and instruct others in the care of his patients.

An outside or ambulatory clinic is necessary, as it is only by this means that a well-balanced course in surgery can be given. Here the student meets the conditions as he will be required to meet them in practice. And it is only by means of an ambulatory clinic that bovine surgery can be taught.

Another form of teaching that is often neglected is experimental work. A certain amount of this must necessarily be done by the instructor in order that he may keep up with the profession and by allowing the student an interest in the work he is taught to think for himself and made to realize that after graduation he still has a chance to study.

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY.

PRESIDENT DAVID W. COCHRAN'S INAUGURAL ADDRESS.

Fellow Practitioners: Before reading to you my inaugural address I wish to call your attention to the fact that this is the twenty-fifth year of the incorporation of this association. It is fitting that some recognition will be taken of it during the year. It is the purpose of every man's life to do something worthy of the recognition and appreciation of his fellow-man. There is no accomplishment of mine of sufficient importance to have accorded me the honor which you have conferred on me by electing me President of the Veterinary Medical Association of New York City for the ensuing year. For your generosity in thus honoring me I feel most grateful. The span of man's activity is so short that many who are most worthy can not receive this honor; that you should have conferred it on me affects me profoundly. In return for your confidence it will be my pleasure to give my best energy and thought and judgment to the welfare of the V. M. A. of N. Y. C. during the ensuing year.

In an address of this kind one is at a loss to know what is timely. I have nothing new to offer and shall remain within the limits of the practical. Year after year at our meetings we see the familiar faces of faithful attendants, with a few recruits each year. Your presence proves interest in your work and the desire to take something away which will increase efficiency in the performance of your labors; if new ideas are derived as a result of this communion we shall feel that the meetings have not been in vain.

Our medical societies are our post-graduate schools and clearing houses, through which we become better informed, not only in medical matters, but in regard to our profession in general. He who keeps above the standard desires companionship; therefore, if we elevate the ethical and educational average, we increase the brotherhood of the profession and enhance the percentage of efficiency to the public. The ideal of medicine should be the stimulation of individual exertion to the highest degree and the establishment of a standard the attainment of which should be the one great desire of every member of our profession. The demands of the times are that we should level every opposition and make smooth the way for general progress, enlightement, education and the higher ethical obligations.

There will be much study, research and friendly concern shown in relation to the advancement of the profession. We in this country appreciate with deep understanding the services the profession has rendered our country and civilization at large in the course of this great war. The wonderful readiness and efficiency of the profession, the matchless courage and devotion of its members, the surprising energy and skill of the leaders in organizing the sections for war, almost over night, from a state of pacificy, are phenomena of the war deeply impressed on every veterinarian. It is our joy and pride that the profession was enabled in some degree to render such valuable service. The era of bloodshed and the smoke of battle has been followed by our triumph and self-glorification.

For the Future.

Taking my own experience and comparing it with others, when we take up the reconstruction crusade, which is the natural successor of the world war, the sudden transition from a war to a peace basis, we find every phase of our life is impatiently exclaiming "Let's go!"—commerce, industry, agriculture—all having been crowding the barrier waiting for peace to give the signal to start. We imagine the wonders of the next twelve months will be amazing enough to bewilder us all. America, borne down by the pressing weight of war, will leap upward like a spring released.

Our Patriots.

Several of our members have taken an active part in this great war and during the new year we hope to have with us at each

meeting one or more from "Over There" and to the end that they may be fittingly welcome, it will be a privilege indeed to express our joy to those who have fought so bravely and won so gloriously the intense admiration and affection of us all, and with that profound satisfaction which affects us all in the victory over which we rejoice and with which the hearts of the members overflow, to be enabled to extend to them a true and loyal welcome.

SOUTHEASTERN STATES VETERINARY MEDICAL ASSOCIATION.

The third annual meeting of the Southeastern States Veterinary Medical Association was held at Birmingham February 20-22. The association was largely attended by members, visitors and representatives of commercial houses. Some thirty new members were elected to membership. The meeting was an unusually successful one, which was highly interesting and instructive to all attending.

The association was called to order by President Dr. F. W. Morgan. In the absence of Dr. N. A. Barrett, president of the Birmingham city commission, Dr. C. A. Cary was called upon for the address of welcome, which was responded to by Dr. M. Jacob, who became aware that the Hotel Tutwiler was the best in the country upon asking the price of his room.

Dr. A. T. Kinsley gave a most interesting and instructive paper on the subject of "Infection and Immunity," which was discussed quite generally. The following points were brought out: Infection usually occurs only in susceptible damaged tissue; infection may result in physical or chemical injury, usually the latter; chemical products in the form of toxins, endo-toxins, etc., result in immunity, which may be toxic immunity, bactericidal or osonic.

Dr. E. A. Cahill followed Dr. Kinsley with another valuable and appreciated paper on "Swine Plague and Mixed Infections of Swine." Dr. Cahill believes that these troubles are specific entities and difficult or impossible of differentiating from so-called chronic cholera. Discussion of this paper was postponed till after other papers upon "Hemorrhagic Septicemia" and "Hog Cholera" had been read.

Dr. H. Jensen gave a rather full description of the symptoms and diagnostic features of hemorrhagic septicemia in cattle

Dr. A. L. Hirleman presented a paper on "Hog Cholera Control," in which he cited the more recent government findings regarding the probable exaggerated belief in the spread of cholera by such carriers as dogs, shoes of people, wagons, etc. This paper was discussed at length by Dr. H. C. Wilson. He hopes that the treatment work in cholera control will soon be turned over to the veterinarians and that only the inspection work will be left to the state and federal officials. Dr. Cahill was again called upon to repeat his differential diagnosis of cholera and other swine infections. Dr. Kinsley questioned the reference to cholera lesions and asked if cholera was not virtually a lesionless disease. Regarding control work by veterinarians and county agents, a contrast of the amount of cholera present in the states of Missouri and Nebraska was made.

In order to allow the speaker to catch an early train, Lieutenant Blasingame of the Federal Bureau of Public Health next gave an interesting paper on "Control of Venereal Disease in Man." He would encourage treatment of such disease by physicians only and prevent self-treatment and patent medicine treatment. Many drug stores had agreed not to carry such patent remedies, but corner grocery stores are often gross offenders. Even small towns should have public health clinics for all diseases, and they should not be stigmatized as venereal clinics. The control of such disease is a publicity problem and not a moral one. Lieutenant Blasingame was given a rising vote of thanks for his contribution to the program.

The discussion of hog cholera and mixed infections of swine was again resumed. Dr. Jensen doubts the existence of cholera without mixed infections. Dr. J. S. Koen finds it impossible to differentiate swine diseases either from symptoms, lesions or specific treatment. He cited some experimental treatments for several outbreaks of disease, with very confusing results. In one extensive outbreak under his observation, he was satisfied the trouble was "flu." The symptoms tallied exactly with those his physician had diagnosed in him as "flu" and he could make nothing else out of it.

Dr. F. P. Caughman led in a discussion of Dr. Jensen's paper on "Hemorrhagic Septicemia in Cattle." He related his experience with the trouble and gave the symptoms and lesions he had found. Drs. Bahnsen, Cary and Hutchens are quite sure that the "mad itch" in the South is different from that in the West and probably not a form of hemorrhagic septicemia.

Mr. I. C. Brenner gave a very entertaining talk, illustrated by views on his trip over the United States recently for the American Journal of Veterinary Medicine.

Dr. N. S. Mayo also presented a few interesting views, scenes from Cuba, with well-chosen remarks.

The influenza discussion was opened by Dr. M. J. Ragland with a few remarks regarding his experience with the British and American army horses and mules passing through the yards at Spenser, North Carolina. Dr. Kinsley stated that little definitely was known concerning influenza, but he believes there are several different entities classed as influenza. He thinks pink-eye is probably due to a filterable virus. Dr. Roberts didn't doubt the various entities, but, like in human "flu" and swine infections, believes the possibility in the majority of cases of a specific predisposing infection followed by one or more infections. Other predisposing factors, however, are quite possible at times. Dr. M. Jacob stated good results had apparently followed rigid sanitary measures in cleaning up all centers where animals were collected in sale stables and yards. One year's experience, however, is not conclusive. Drs. Piatt, Bahnsen, Staley, Bell and Morgan reported cases of suspected forage poisoning, rather than some form of influenza, but a satisfactory diagnosis could not be made.

Owing to the fullness of the program, the introduction on the program of a visit to the Ensley steel mills, and the absence of the writers of several good papers, the following papers in the hands of the Secretary had to be omitted: "Abortion Disease," by Dr. E. T. Hallman; "Anthrax and Blackleg," by Dr. A. Eichhorn; "Diagnostic Agents," by Dr. A. R. Ward. It was unfortunate that these papers could not be read, for they contained valuable information.

Dr. I. S. McAdory read a timely paper on "Wound Infections." Dr. Mayo discussed the results obtained in treating many infected wounds by the use of chlorazene and dichloramine-T. Dr. M. F. Jackson had failed to get a satisfactory sprayer for dichloramine-T, hence was still relying largely on his old standby, tincture of iodine. Dr. R. C. Moore had obtained some splendid results by continuous irrigation with very weak formaldehyde solution. Dr. Kinsley called attention to the danger of continuous irrigation unless good drainage provided, especially if there was much force to the irrigating stream.

Dr. M. Jacob made report for the Nomenclature Committee on "Black Tongue in Dogs" and recommended the substitution of "Southern Dog Plague."

On Friday morning the association assembled in front of the Hotel Tutwiler for a picture for a Birmingham evening paper.

Dr. J. S. Andrade next read a paper on "Acute Indigestion of the Horse." He recommended the use of the stomach tube, passing the same through the nostril. The paper was discussed at length by Dr. C. J. Norden, who preferred passing the tube through the mouth, after ligating the jaws and lubricating the tube with a solution of sodium thiosulphate.

Major R. M. Staley of the United States Army gave a rather detailed account of the duties of veterinarians in the various branches of the army service. Some things accomplished were much to be desired, many things were not as desired, but could have been worse. He felt that a great deal of unjust criticism of the army had been made by veterinarians both within and without the army. He reported that Dr. D. S. White had been raised to a full colonel upon the staff of General Pershing.

The following officers for the ensuing year were elected at the business session:

President—Dr. G. A. Roberts, Raleigh, North Carolina.

First Vice President—Dr. J. S. Andrade, Huntsville, Alabama.

Second Vice President—Dr. F. P. Caughman, Columbia, South Carolina.

Third Vice President—Dr. J. W. Salter, Dawson, Georgia.

Secretary-Treasurer—Dr. H. C. Hutchens, Atlanta, Georgia.

On Friday afternoon the association assembled in the rooms of the Birmingham Rotary Club, from which place we were taken in automobiles to the large Ensley steel mills. Here we were shown through the plant and observed the process of converting huge masses of red-hot steel into steel rails. The afternoon was greatly enjoyed by all.

At 7 o'clock p. m. the association assembled for its annual banquet, with Dr. A. T. Kinsley as toastmaster. Major Staley, Dr. Roberts, Dr. Jensen, Dr. Bahnsen and Dr. Hirleman responded to toasts.

Dr. D. M. Campbell presented a paper on "Reconstruction Problems Confronting the Veterinarian." The problems were so many and variable that he found it difficult to recommend specific remedies for these problems. The paper was discussed

by Dr. Tait Butler, who held that the reconstruction would necessarily be in the veterinarian posting himself upon animal husbandry subjects.

Dr. N. S. Mayo, Secretary of the American Veterinary Medical Association, enumerated the objects of the national association and urged all present to embrace the opportunity of making this the banner year for the South in new members of the A. V. M. A.

Dr. C. A. Cary discussed the arrangements for entertainment of the A. V. M. A. at New Orleans in November. He stated that Louisiana had appointed a local committee and suggested that each state in the South do its part in coöperation with the Louisiana committee. Upon motion, a steering committee, consisting of Drs. C. A. Cary (chairman), Tait Butler and Peter Bahnsen, was appointed to aid in the coöperation of the southern states with the Louisiana committee. The Mississippi State Veterinary Medical Association reported that they had recently voted $100.00 for the New Orleans meeting and would raise more by individual subscription, if wanted. Upon motion, a subscription was started among the members of the Southeastern States Association, which resulted in the raising of more than $200.00.

The Necrology Committee reported the following deaths:

Dr. T. B. Carroll, Wilmington, North Carolina; Dr. J. F. Foley, Kingston, North Carolina, and Dr. T. D. Jackson, Talladega, Alabama, charter members, and Dr. S. G. Carter, Roanoke, Alabama.

The resolutions adopted by the association included those expressing appreciation for services and hospitality shown by the local veterinarians, the Birmingham Rotary Club and the management of the steel plant at Ensley; also an expression of our indebtedness to visiting veterinarians coming from a distance and adding so much to the interest and usefulness of our program; condemning the general distribution of tuberculin and mallein, which should be placed only in the hands of qualified and legally recognized veterinarians; one relating to the B. A. I. employees, as follows:

Whereas, The Veterinarians employed by the United States Bureau of Animal Industry are rendering conspicuous and invaluable service in affording protection to public health by an efficient inspection of meat and meat food products and in the protection rendered the live stock industry by the control and eradication of animal diseases; and,

Whereas, It is a notorious fact that these faithful public servants have never received just compensation for their services; and,

Whereas, The present parsimonious salaries compel many of the most efficient to sever their connection with the Bureau, thus threatening the Service with demoralization; therefore, be it

Resolved, by the Southeastern States Veterinary Medical Association, That we endorse the Rainey amendment now pending before Congress, which provides for increased compensation; and, be it further

Resolved, That the officers of this association are hereby instructed to urge the Secretary of Agriculture and all members of Congress representing these southeastern states to actively support such measures as will secure just classification and adequate compensation for these worthy members of our profession.

The following were elected to honorary membership in the association: Drs. E. A. Cahill, J. S. Koen, R. C. Moore and Major R. M. Staley.

The association accepted the invitation to meet in Atlanta for its 1920 convention. The date of the meeting was left for the Executive Committee to fix.

An interesting and well-attended clinic was provided for the morning of the last day by Drs. Jackson, Piatt and French. The following demonstrations were given:

The technique of cryptorchid castration in the horse, by Dr. William Bell.

Chloral hydrate (intraperitoneally) anesthesia in mule, by Dr. R. C. Moore.

Stomach lavage (to be passed through nostril) of mule, by Dr. J. S. Andrade.

Intrapalpebral malleinization of mule, by Major R. M. Staley.

Intradermal tuberculinization of cow, by Dr. G. A. Roberts.

Anti-rabic immunization of dog, by Dr. D. A. Piatt.

Intraperitoneal injection of anti-hog cholera serum of hog, by Dr. G. R. White.

The third annual convention closed with expressions from all attending that a splendid successful meeting had passed into history. G. A. Roberts, Secretary.

Dr. G. B. Munger, veterinary inspector on hog cholera control work for the B. A. I., has recently been transferred from Rock Island, Illinois, to Cedar Rapids, Iowa, where he succeeds Dr. B. H. Borman. Dr. Borman has been transferred to tuberculosis eradication work, with headquarters at Madison, Wisconsin.

COMMUNICATION.

To the Editor:

The February, 1919, issue of the Journal, on page 628, includes the caption "The Bland Reports Upon Epizootic Abortion Experiments," by W. L. Williams, and the subject matter that follows does not limit itself to a discussion of the reports.

Without commenting on the part pertaining to the discussion of the report at this time, it is timely to call attention to the concluding sentence: "No British maker of biologic products, so far as a search among advertisements in English journals reveals, offers bacterins, vaccines or other 'cures' for 'abortion'."

While the first part of the sentence may be correct, that advertisements cannot be found, the same cannot be said of the latter portion, "Offers bacterins, vaccines or other 'cures' for 'abortion'." Attached hereto is a label from an ampul, which is self-explanatory:

BACILLUS ABORTUS VACCINE ('WELLCOME') 826/I
TRADE MARK
BRAND
(For the prevention of bovine epizootic abortion)
Prepared and Tested at the 5 c. c. containing **100,000** million organisms
Wellcome Physiological Research Laboratories
Brockwell Hall, Herne Hill, London, (Eng.) *Series:* W 208A

It is noteworthy that the product is offered for the prevention of Bovine Epizootic Abortion and not "Cures for abortion," and it does not differ in this respect from similar products of American manufacture.

Very truly yours,

H. K. MULFORD COMPANY.
JOHN REICHEL, Director.

Major Wm. V. Lusk, for over twenty years a subscriber to the Journal, has returned from France, where he was with the A. E. F., and has resumed his practice at Burlington, Vermont.

Dr. Sherman Ames has taken over the practice and is conducting the small animal hospital formerly operated by the late Dr. C. B. Palmer at Easton, Pennsylvania.

Lieutenant Harry H. Ross has received his honorable discharge from the Canadian Army Veterinary Corps and has resumed his former practice of veterinary medicine at Brandon, Manitoba.

NECROLOGICAL.

DR. J. G. HEIGHWAY.

Dr. Heighway, Ladoga, Indiana, was born September 2, 1864, died February 18, 1919. Was a graduate of the Toronto Veterinary College in 1888. A wife, two sons and two daughters survive him. He enjoyed a very extensive practice and was well known over a good portion of the State of Indiana. For many years an influential member of the Indiana State Veterinary Medical Association, always taking an active part in the discussions as well as repeatedly contributing to the literary program at the association's meetings, we will all feel this great loss.

G. H. R.

DR. F. E. BURNHAM.

Frank E. Burnham, D. V. S., died at his home, 1415 John Avenue, Superior, Wisconsin, February 17, 1919. He had been confined to his bed since November, 1918. The Doctor was born in Independence, Iowa, in 1860 and came to Superior immediately after his graduation from the Chicago Veterinary College in 1890. He had practiced there continuously until November, 1918, when he was forced to retire on account of poor health, being one of the oldest settlers at the Head of the Lakes. He was the first City Veterinarian to be appointed by the City of Superior and had held this office until his death. Dr. Burnham was also a Deputy State Veterinarian.

In 1899 he joined the A. V. M. A. and was also a member of the Wisconsin Veterinary Medical Association, the Knights of Pythias and the Superior Commercial Club. He was a man of great personality, high ideals and sterling character, taking a wonderful pride in his chosen profession, and beloved by all who knew him. A wife and daughter mourn his loss. R. D.

DR. JAMES LEWIS.

The following resolutions were adopted by the Mississippi State Veterinary Medical Association:

The vacancy at this meeting and the absence of that familiar voice we have so often heard reminds us that fitting respect for

the distinguished dead impels us to place on record some memorial of his labors, some token of our esteem and regret.

It is always sad and sorrowful to witness the removal of our dear ones from this earth. The bitter pangs of anguish linger a long while and only through the mercy and loving kindness of God can we find relief.

The subject of this tribute, Dr. James Lewis, died at McKinney, Texas, in January, 1919. He was a graduate of the Chicago Veterinary College and had resided for the past seven years at Greenwood, Mississippi, where he had a lucrative practice. He was for many years an honored member of this association. It is the friendship of such a character as dear Dr. Lewis that makes life worth living. We loved him in life and we respect his memory now that he is dead. He was faithful to our association, just to his fellow man. He always held high the lofty ideals which should characterize the conduct of a veterinarian.

The night dew that falls, though in silence it weeps,
Shall brighten with verdure the grave where you sleep.
And the tear we shed, though in secret it rolls,
Shall long keep your memory green in our souls.

Of the service of this distinguished son of Texas some enduring memorial should be made. Therefore, be it

Resolved, by the members of the Mississippi State Veterinary Medical Association, That these resolutions be spread upon the Journal as a mark of the esteem in which this body held the late deceased and as a token of our reverence for his memory. And that a copy be sent to the family.

DR. FREDERICK W. HUNTINGTON.

Dr. Frederick W. Huntington died at the Maine General Hospital, Portland, Maine, January 23, 1919. He was born in Monmouth, Maine, February 8, 1857, and was graduated from the American Veterinary College, New York City, in 1883. After graduation he began active veterinary practice in Portland, and was appointed as a local veterinary inspector in the Bureau of Animal Industry January 1, 1892. He has been in continuous service of the bureau at the port of Portland since appointment, and for 27 years has had charge of meat inspection; Canadian import and export inspection; and interstate inspection of cattle and horses. J. R. M.

DR. J. D. DURACK.

Dr. J. D. Durack, for twenty-five years a practicing veterinarian at Geneseo, Illinois, was struck by a fast train on January 27 at a crossing in Geneseo, and instantly killed, the deceased's view being obstructed by a string of box cars.

Dr. Durack was born in Sheffield, Illinois, March 6, 1867, and was graduated from the Chicago Veterinary College with the class of 1893. He was appointed Assistant State Veterinarian by Dr. Dyson in 1914. The Doctor leaves a widow, two young sons and a legion of friends. G. B. M.

REVIEWS.

A TEXT-BOOK ON GENERAL BACTERIOLOGY.

By EDWIN O. JORDAN, Ph.D. Professor of Bacteriology in the University of Chicago and in the Rush Medical College. Sixth edition thoroughly revised. Octavo of 691 pages, fully illustrated. Philadelphia and London: W. B. Saunders Company, 1918. Cloth, $3.75 net.

The success of Jordan's Text-Book of General Bacteriology is assured from the fact that the sixth edition has followed the fifth in two years. The sixth edition contains but 22 pages more than the fifth, which has kept the revised edition within a space that can be covered by the student. The more important changes that have been made are the rewriting of the chapter on the pneumococcus and a careful revision of that on the meningococcus, together with brief summaries of the present knowledge of infectious jaundice, rat bite fever and trench fever. Numerous minor changes, corrections and additions have been made.

The subject of bacteriology is one that the author of this book believes should find a place in every general scientific course. It is of special professional interest to medical and veterinary students, but the subject also has a direct technical bearing on household administration, agriculture, sanitation and sanitary engineering and to various industries and technological pursuits. For the general scientific student and reader, bacteriology presents certain aspects that tend to widen the outlook upon a variety of human interests. While there is considerable overlapping in the subject of bacteriology as applied to these different subjects, the essential matter is quite different in each. The scientifically trained person needs for his general understanding of many of the phenomena of nature, including health and dis-

ease, a somewhat broad knowledge of microörganisms—what they are, where they are and what they do.

The author of this book teaches bacteriology to university students in scientific courses and to medical students and consequently it would be expected that the volume is designed for the use of students in such courses. As Dr. Jordan is a distinguished epidemiologist, it naturally follows that the greater part of the description of species is devoted to those microörganisms causing human infections and epidemics. There are, however, in addition to these strictly medical phases of the subject, interesting instructive chapters on higher bacteria and protozoa pathogenic for man; filterable virus; bacteria of milk and milk products; nitrifying bacteria; bacteria in the arts and industries; bacteria of air, soil and water; and bacterial diseases of plants.

The chapters that are perhaps the most noteworthy for their excellence in explaining difficult technical subjects are those on the structure and mode of development of bacteria; composition of bacteria; the effect of physical and chemical agents upon bacteria; and the effect produced by bacterial growth. The other chapters on classification and general bacterial technique are good.

The organic structure of the book is commendable. In style it is clear and the space devoted to the various topics is well proportioned. In selecting data from the voluminous literature the author has exercised a delicate discrimination and presented only that which seems to be of the most importance. There are numerous references to the literature which add to its value. The text illustrations, of which there are 177, are excellent.

There are several minor points on which opinions may differ as to the interpretation of phenomena and in a few instances slight changes suggest themselves. However, these are in connection with topics that are as yet more or less controversial. As the author is a research worker of authority and a teacher of high standing, the text, as well as the subject matter, is admirably adapted to the needs of students. It is difficult to suggest how a greater number of important bacteriological facts could be more fully or concisely presented. For medical students or for those wishing a knowledge of the role bacteria play in nature's economy, this volume is to be highly recommended.

The publishers have done their part in a very acceptable manner. V. A. M.

MISCELLANEOUS.

HELP NEEDED.

The following letter was received recently by a member of the American Veterinary Medical Association:

"I have been kinder forced to do some veterinary practice for years in our 'Out of the way' country, but have never been licensed, but I expect to soon take the examination and I herein enclose some 'Quizs' sent me by the secretary of the State Board. As I haven't made any study of veterinary sciences beyond Arecoline (and Arecoline has certainly done some marvelous acts for me) I am going to enclose the Quizs and request you to fill them out for me and I shall send you my check for your charges. Of course, I feel quite sure that you will not charge me unreasonably for this assistance."

History doth not record this request as having been granted.

HEADS DEPARTMENT OF VETERINARY MEDICINE.

Dr. Ralf R. Dykstra, for eight years a member of the faculty of the Kansas State Agricultural College, is now head of the Department of Veterinary Medicine. His appointment to fill this position, vacant for some time, has just been announced.

Dr. Dykstra is one of the leaders in his field of study in the United States, and in addition is a very successful executive. For the year 1917-1918 he was president of the Kansas Veterinary Medical Association. He is also active in local affairs in Manhattan. He is vice president of the Chamber of Commerce and a member of its board of directors. He is prominent in Masonic work.

Born in the Netherlands, Dr. Dykstra came to this country with his parents when only two years old and spent his boyhood in Iowa. He attended the Iowa State College, receiving the degree of doctor of veterinary medicine in 1905. Immediately upon his graduation he was made Assistant Professor in his alma mater and remained at that institution for six years, being Professor of Anatomy at the time of his resignation.

After a few months spent in the service of the Bureau of Animal Industry, United States Department of Agriculture, Dr. Dykstra came to the Kansas State Agricultural College. His work here has been principally in the field of surgery, and has been highly successful in practical surgical work.—*The Kansas Industrialist.*

(The Journal heartily congratulates Dr. Dykstra on his well-earned promotion.

OKLAHOMA NOTES.

Lieutenant W. P. Shuler has been honorably discharged from military service and is opening an office in Oklahoma City. He is specializing on the treatment of sterility in valuable animals, of which there appear to be quite a number among the high-priced cattle in this state.

Dr. J. E. Nance, formerly with the Agricultural and Mechanical College at Stillwater, has a monopoly on the hog vaccinating business at the Oklahoma City stock yards and is doing a good business. He is also an extensive dealer in Airedale dogs.

Dr. L. J. Allen, inspector in charge of tick eradication, is recovering from a severe attack of influenza.

Lieutenant C. E. Steele, who has been with the Army Veterinary Corps for over a year, has returned to Oklahoma City and opened an office in the location formerly occupied by Dr. J. M. Vrba, deceased.

Dr. E. V. Robinette has been appointed State Veterinarian and is being kept quite busy. He is making a drive on tuberculosis, which appears to be quite prevalent among the dairy cows which are being shipped in from the northern states.

Dr. H. A. Roscoe, formerly with the B. A. I., has secur ed a much more lucrative position with the Western Weighing Asso-ciation at the stock yards. He makes post-mortem exam nations on all stock which is found dead in the railroad cars and the data which he furnishes is of great assistance to the tra nsportation companies in passing on claims for losses.

Drs. F. C. Pryor of Wewoka and D. W. Gerb er of Oklahoma City have been appointed members of the State Board of Veterinary Examiners.

The Legislature has passed a bill provid ng for the testing of all cattle which are suspected of being tu bercular and reimburs-

ing the owners for their losses on condemned stock. It also authorizes the establishment of segregated herds of tubercular cattle where the breeding value of the cattle will justify such action. The act provides for the appointment of four Deputy State Veterinarians at a salary of $2,100 per year. The latter provision was secured as the result of the work of a committee from the state association, viz: J. S. Grove, Oklahoma City, W. H. Martin, El Reno, and C. R. Walter, Tulsa.

Dr. W. C. Drake of the B. A. I. has been appointed as inspector in charge of tuberculosis eradication in this state and he has already located quite a number of diseased herds.

About 12,000 dairy cattle have been brought into the state in the last year and they are furnishing plenty of business. Henceforth all dairy and breeding stock coming into the state will be quarantined until released by the state or coöperating federal veterinarians.

J. S. GROVE,
Resident State Secretary.

THE HARRISON ACT.

The Harrison Act, as amended by the new war revenue act, will be mailed postpaid to any druggist, physician, dentist or veterinarian who will send a postal request therefor to "Mailing Department, Parke, Davis & Co., Detroit, Michigan." Please observe directions strictly.

THE RELIEF OF RASTUS.

Here is a little story that was told by Congressman James B. Cantrill of Kentucky when the conversation in a Washington club turned to the handicaps of the aged.

Recently a bull on a big country estate became so unsafe that it was found necessary to send for a veterinary surgeon and have him dehorned. As the veterinarian was leaving after having removed the dangerous weapons of Taurus he met an old colored man shuffling along the driveway.

"I sure am glad, doctah," said Rastus, with a look of great relief, "dat yo' hab done gone an' chopped de hö'ns offen dat bull."

"Why do you say that, Rastus?" smiled the veterinarian.

"It am jes' dis way, Doctah," rejoined the colored man, "I'se too old ter climb trees and I'se too young ter die."—Philadelphia Telegraph.

The Henryetta, Oklahoma, Chamber of Commerce invites some veterinarian to locate in that city of 30,000 inhabitants and large mining interests.

The Bridgeport, Connecticut, Board of Health is about to establish the position of Meat Inspector for that thriving city. Veterinarians are invited to consider the proposition.

Dr. S. E. Weber of Lancaster, Pennsylvania, was a visitor to New York in February incident to placing his plans to control odors, etc., in rendering plants, and the sterilizing of hospital rooms and other buildings.

Legislation in the New York Legislature contemplates reopening registration to non-graduates. Increasing the taxes on bitches to ten dollars. Enlarging the power of the Department of Farms and Markets to extend the control of bovine tuberculosis and the establishment of accredited herds. A state milk commission to control the production and sale of milk and all milk products. To treble the damages to be collected from dog owners whose dogs kill sheep.

A New England reunion of all the graduates of the several veterinary schools of New York City now united under the New York State Veterinary College at New York University will be held in Boston, Massachusetts, on the fourth Wednesday in April.

The Journal begs to acknowledge with thanks the announcement of the wedding of Miss Edna Eleanor Biddison of Tulsa, Oklahoma, to Dr. John Wallace Lumb of Sioux City, Iowa, which happy event took place on Saturday, February 22, 1919. The Journal wishes the young couple long life, happiness and prosperity.

Dr. Russell A. Runnells, formerly of the Veterinary Training School at Camp Lee, Virginia, has accepted an appointment as Assistant in Animal Pathology at the Michigan Agricultural College, East Lansing, Michigan.

Lieutenant James W. Benner, who was stationed at Camp Greenleaf, has received his discharge and returned to his position as Assistant Professor of Veterinary Medicine at the Michigan Agricultural College, East Lansing, Michigan.

DR. WINCHESTER ADDRESSES BOARD OF HEALTH.

According to the Lawrence (Massachusetts) Sun American, Dr. J. F. Winchester addressed the board of health and told how House Bill 1151 relative to the inspection of all cattle for slaughtering after being reported favorably to the house by the committee on public health received a solar plexus knockout on the floor of the legislature and asked that the state board or the governor be communicated with in an effort to reopen the case.

Dr. Sullivan said it was lamentable and a sad commentary upon the intelligence of the legislature of Massachusetts to see them kill measures of this kind, and in the face of the tremendous amount of time and money that is being spent in an effort to prevent the spread of tuberculosis. "It is a pity that the inmates of these public institutions are compelled to eat meats that have not undergone the proper inspection," said the doctor.

It was voted to have the chairman of the board of health and Dr. John F. Winchester, cattle inspector, communicate with the state board and the governor on the matter.

At the meeting of the health board the American Health Association invited the local health board to become affiliated with that organization. The invitation was accepted, and the members voted to connect up with that health association.

The following is a copy of House Bill 1151 above referred to:

AN ACT

Relative to the Slaughtering of Neat Cattle, Sheep or Swine.

Section one hundred and five of chapter seventy-five of the Revised Laws, as amended by section two of chapter three hunderd and twelve of the acts of the year nineteen hundred and two, by section two of chapter two hundred and twenty of the acts of the year nineteen hundred and three, by section six of chapter three hundred and twenty-nine of the acts of the year nineteen hundred and eight, by section two of chapter two hundred and forty-eight of the acts of the year nineteen hundred and twelve, and by chapter one hundred and thirty-nine of the acts of the year nineteen hundred and sixteen is hereby further amended by striking out the words "intended for sale",—so that said section will read as follows:—

Section 105. The provisions of the six preceding sections shall not apply to a person not engaged in such business, who, upon his own premises and not in a slaughter house, slaughters his own neat cattle, sheep or swine, but the carcass of any such animals shall be inspected, and, unless condemned, shall be stamped or branded according to the provisions of section one hundred and three of chapter seventy-five of the Revised Laws, as set forth in chapter two hundred and twenty of the acts of the year nineteen hundred and three, and as amended by chapter four hundred and seventy-one of the acts of the year nineteen hundred and nine and by section five of chapter two hundred and ninety-seven of the acts of the year nineteen hundred and eleven, by an inspector at the time of slaughter.